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NATIONAL DAM SAFETY PROGRAM. NEW STREET RESERVOIR DAM (NJ00242)--ETC(U)

AUG 78 R GERSHOWITZ

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LEVEL

PASSAIC RIVER BASIN

SLIPPERY ROCK BROOK, PASSAIC COUNTY

NEW JERSEY

NEW STREET RESERVOIR DAM

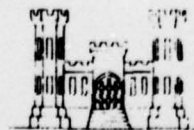
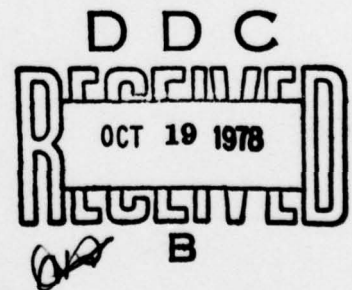
PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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NJ 00242



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106
AUGUST 1978

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE-2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

28 SEP 1978

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Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for New Street Reservoir Dam in Passaic County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, New Street Reservoir Dam, a high hazard potential structure, is judged to be in reasonably good condition with the spillway considered adequate. However, excessive pumping from the Little Falls Pumping Station into the reservoir must be avoided to prevent overtopping of the dam. To insure adequacy of the 53 year old structure, the following actions, as a minimum, are recommended:

a. Within four months from the date of approval of this report, the owner should install a high water level alarm and pump shut-down control on the reservoir to prevent recurrences of overtopping of the dam. A temporary alternative would be to remove some of the stoplogs presently in the spillway. A sufficient number of boards would have to be removed so that spillway discharge could not be exceeded by pumping from the Little Falls Pump Station.

b. Within six months from the date of approval of this report, the owner should initiate a program of annual inspections of the dam utilizing the standard visual check list in this report. Headwater and tailwater gages should be installed in the dam and read out during severe rainstorms and routine operating and maintenance visits to the dam. A permanent log should be kept of all maintenance and operating events of the dam, the lake and the outlet passages.

NAPEN-D

Honorable Brendan T. Byrne

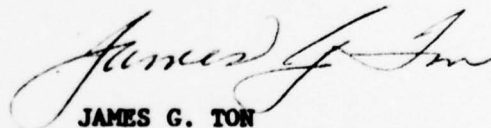
c. Within one year from the date of approval of this report, the upstream face of the dam should be waterproofed by application of gunnite, chemicals, or membrane coatings to prevent leakage and possible further leaching of concrete in arch shells. Chemical analysis of the leach deposits should be made to determine if they are formed from concrete leaching or dissolved chemicals in the water.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Robert A. Roe of the Eighth District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia, 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely yours,



JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Cy furn:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N. J. Dept. of Environmental Protection
P.O. Box 2809
Trenton, NJ 08625

NEW STREET RESERVOIR DAM (NJ00242)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 30 June and 7 July 1978 by Harris-ECI under contract to the State of New Jersey. The state, under agreement with the U. S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

The New Street Reservoir Dam, a high hazard potential structure, is judged to be in reasonably good condition with the spillway considered adequate. However, excessive pumping from the Little Falls Pumping Station into the reservoir must be avoided to prevent overtopping of the dam. To insure adequacy of the 53 year old structure, the following actions, as a minimum, are recommended:

a. Within four months from the date of approval of this report, the owner should install a high water level alarm and pump shut-down control on the reservoir to prevent recurrences of overtopping of the dam. A temporary alternative would be to remove some of the stoplogs presently in the spillway. A sufficient number of boards would have to be removed so that spillway discharge could not be exceeded by pumping from the Little Falls Pump Station.

b. Within six months from the date of approval of this report, the owner should initiate a program of annual inspections of the dam utilizing the standard visual check list in this report. Headwater and tailwater gages should be installed in the dam and read out during severe rainstorms and routine operating and maintenance visits to the dam. A permanent log should be kept of all maintenance and operating events of the dam, the lake and the outlet passages.

c. Within one year from the date of approval of this report, the upstream face of the dam should be waterproofed by application of gunnite, chemicals, or membrane coatings to prevent leakage and possible further leaching of concrete in arch shells. Chemical analysis of the leach deposits should be made to determine if they are formed from concrete leaching or dissolved chemicals in the water.

APPROVED: _____

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: _____

28 Sep 78

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: New Street Reservoir Dam, I.D. NJ00242
State Located: New Jersey
County Located: Passaic
Stream: Slippery Rock Brook
Date of Inspection: June 30, and July 7, 1978

Assessment of General Condition

The spillway capacity of the New Street Reservoir is considered adequate as far as the PMP event is concerned. Excessive pumping into the reservoir, however, from the Little Falls Pumping Station must absolutely be avoided to prevent overtopping of the dam.

At present the engineering data available is not sufficient to make a definitive statement on the stability of the dam.

While it is not felt that any action of an urgent nature is required, it is felt that the following recommendations should be carried out within a reasonable period of time.

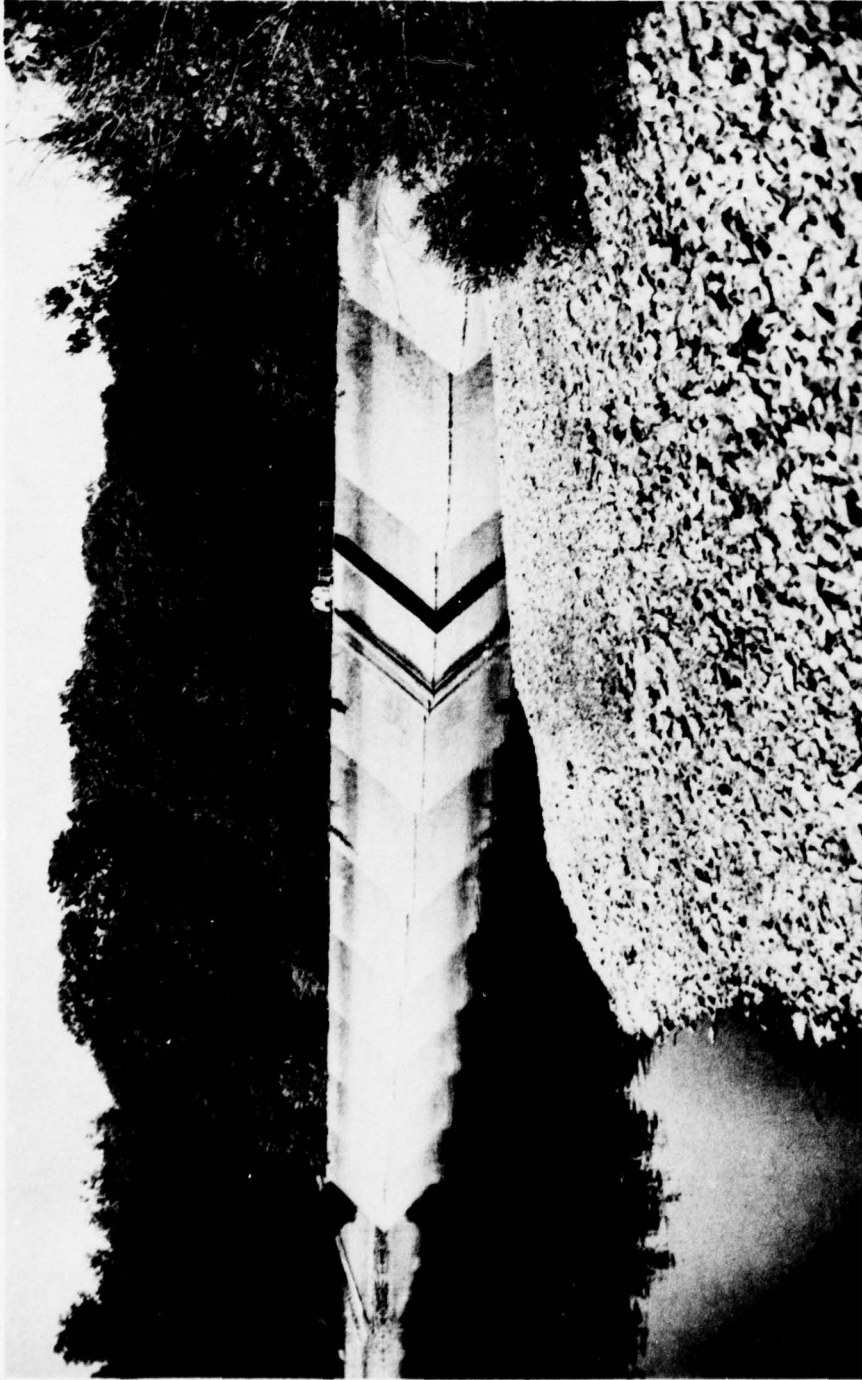
1. The owner should install a high level alarm and pump shut-down control on the reservoir to prevent recurrences of overtopping of the dam.

A temporary alternative would be to remove some of the stoplogs presently in the spillway. A sufficient number of boards would have to be removed so that spillway discharge could not be exceeded by pumping from the Little Falls Pump Station.

2. The upstream face of the dam should be waterproofed by application of gunnite, chemicals, or membrane coatings to prevent leakage and possible further leaching of concrete in arch shells. Chemical analysis of the leach deposits should be made to determine if they are formed from concrete leaching or dissolved chemicals in the water.

Robert Gershowitz P.E.
Robert Gershowitz, P.E.





June 30, 1978

NEW STREET RESERVOIR

Upstream view of dam from right shoreline.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW STREET RESERVOIR, ID. NJ00242

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

The National Dam Inspection Act (Public Law 92-367, 1972) provides for the National Inventory and Inspection Program by the U.S. Army Corps of Engineers. This inspection was made in accordance with this authority under contract C-FPM No. 35 with the State of New Jersey who, in turn, is contracted to the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

The visual inspection of the New Street Reservoir was made on June 30, and July 7, 1978. The purpose of the inspection was to make a general assessment as to the structural integrity and operational adequacy of the dam and its appurtenant structures.

c. Scope of Report

This report summarizes available pertinent data relating to the project; presents a summary of visual observations made during the Field Inspection; presents an evaluation of hydrologic and hydraulic conditions at the site; presents an evaluation as to the structural adequacy of the various project features; and assesses the general condition of the dam with respect to safety.

1.2 Description of Project

a. Description of Dam and Appurtenances

New Street Reservoir Dam is a multiple concrete arch structure with a small section of embankment on the left side of the dam. The concrete section consists of 12 arches totalling 300 feet in length with a maximum section height of about 26 feet. The embankment section contains a concrete core wall cut-off and is 121 feet in length. Maximum embankment section height is about 8 feet. A small concrete section about 28 feet long on the right side of the dam contains a small culvert spillway, with two 4-foot wide inlets.

Available drawings indicate that the multiple arch structure is founded on bedrock. A concrete cut-off is shown extending into bedrock. A grout curtain is specified below the cut-off. Gravel backfill is shown downstream of the arch to the original surface of rock. A 3-inch cast iron drain is shown in the gravel fill at the low point.

New Street Reservoir is a potable water storage reservoir and has no natural inlet. An interceptor ditch extends around the perimeter of the reservoir to catch surface runoff and divert discharges from Barbour Pond, which is located upstream.

The dam itself is provided with two 42-inch diameter outlets, both of which pass through the base of the dam approximately 6 feet below the local ground level. These two lines are located beneath the fifth arch from the right end of the dam. Cast into the concrete base on the arch is a valve chamber. The left outlet line enters the valve chamber and is capped with a blind flange. The right line is interconnected to the water supply system of the Passaic Valley Water Commission through a 30-inch gate valve.

This valve is normally left in the fully open position. All flow control takes place at Little Falls Pumping Station approximately 5 miles from the damsite. The only use for this valve would be to shut down the line in case of a breakdown or for repair or maintenance work.

The emergency spillway is a rectangular weir with two 4-foot wide by 3-foot high sections fitted with stoplogs. Spillway discharges are channeled into a 2 foot by 3 foot rectangular conduit which releases over ground and into the diversion ditch.

b. Location

New Street Reservoir is located in Passaic County, New Jersey, and is accessible by way of Squirrelwood Road. The dam is on land owned by the Passaic Valley Water Commission.

c. Size and Hazard Classification

New Street Reservoir is classified in the dam size category as being "small", since its storage is less than 1,000 acre-feet and its height is less than 40 feet. Since failure of the dam could cause loss of life and extensive property damage, as determined from the field inspection, a hazard potential classification of "high" has been assigned to the project.

d. Ownership

New Street Reservoir is owned by the Passaic Valley Water Commission, 125 Main Avenue, Clifton, New Jersey, Attention: Mr. R. Inhoffer, General Superintendent.

e. Purpose of Dam

New Street Reservoir is an elevated storage reservoir for municipal potable water supply connected directly to the distribution system of the Passaic Valley Water Commission.

f. Design and Construction History

The dam was designed and constructed about 1925, as determined from dates on drawings. A few drawings prepared at that time, and others prepared later are available from the Passaic Valley Water Commission. No computations for the design of the embankment or structures are available for review. In 1945, abutments Nos. 3 through 7 were reinforced with concrete, and the area below the dam was regraded.

The present structure closely resembles the available plans.

g. Normal Operational Procedures

Water is either drawn-off from the reservoir and supplied to the municipal water main, or if the demand is low, the flow is reversed and water is pumped into the reservoir and stored for later use.

The normal daily fluctuation in reservoir level was reported to range from 3 inches to 2 feet.

1.3 Pertinent Data

a. Drainage Area - 11 acres (Area of the reservoir at elevation 300)

b. Discharge at Damsite

Maximum known flood at damsite	N.A.
Warm water outlet at pool elevation	N.A.
Diversion tunnel low pool outlet at pool elevation	N.A.
Diversion tunnel outlet at pool elevation	N.A.
Gated spillway capacity at pool elevation	N.A.
Gated spillway capacity at maximum pool elevation	N.A.
Ungated spillway capacity at maximum pool elevation	96 cfs (El. 302.73)
Total spillway capacity at maximum pool elevation	96 cfs

c. Elevation (Feet above MSL)

Top of dam	303.0
Maximum pool-design surcharge	302.50
Full flood control pool	N.A.
Recreation pool	N.A.
Spillway crest	300.0
Upstream portal invert diversion tunnel	N.A.
Downstream portal invert diversion tunnel	N.A.
Streambed at centerline of dam	277 (Estimated)
Maximum tailwater	N.A.

d. Reservoir

Length of maximum pool	860 feet (Estimated)
Length of recreation pool	N.A.
Length of flood control pool	N.A.

e. Storage (Acre-Feet)

Recreation pool	N.A.
Flood control pool	N.A.
Design surcharge	270 acre-feet (El. 302.50)
Top of dam	276.5 acre-feet (El. 303.0)

f. Reservoir Surface (Acres)

Top of dam	13 <u>±</u> acres (El. 303.0)
Maximum pool	13 <u>±</u> acres (El. 303)
Flood control pool	N.A.
Recreation pool	N.A.
Spillway crest	11 acres (El. 300.0)

g. Dam

Type	Multiple Concrete Arch and Short Earth Embankment with Concrete Core Wall
Length	449 feet
Height	26 feet
Top width	12 inches
Side slopes	45°
Zoning (Embankment Section)	Core wall with rolled earthfill shells
Impervious core (Embkmt Sec.)	Concrete core wall
Cutoff	Concrete
Grout curtain	Yes

h. Diversion and Regulating Tunnel (N.A.)

i. Spillway

Type	Culvert
Width of weir	Two 4-foot wide inlets
Crest elevation	300

Gates

N.A.

Upstream channel

Reservoir

Downstream channel

Natural stream draining to Highland Lake

j. Regulating Outlets

Two 30-inch diameter conduits. One is operable and is controlled by a gate valve; the other is capped by a blind flange.

SECTION 2: ENGINEERING DATA

2.1 Design

Drawings of the dam were available in the files of the Passaic Valley Water Commission. Also, no hydraulic calculations for the spillway design were available. The plans of the dam correspond well to the present structure as observed.

2.2 Construction

No records have been found as to the construction history of the dam. The source and quality of the embankment materials is unknown. No plans for the embankment or spillway were available. No records of concrete tests or placement records were available.

2.3 Operation

Records of daily flows through the water treatment plant and reservoir level are kept by the operators of the Little Falls Pumping Station.

Evaluation

a. Availability

The availability of engineering data is very poor. The only data available are some drawings illustrating the plan view of the dam, arch sections, core wall and topography which can be obtained from the Passaic Valley Water Commission.

b. Adequacy

The available engineering data is not sufficient to perform a comprehensive, definitive stability analysis of the embankment. Data needed to fully assess the stability of the dam includes:

1. Subsurface information at the damsite, including engineering properties and parameters of the bedrock.
2. Precise information on shape and dimensions of buttress footings and arch cut-offs.
3. Soil properties and geometry of the embankment.
4. Location of the phreatic line within the embankment section at several cross section lines including the maximum section.
5. Verification of, and the vertical extent of the core wall.

A check list of engineering construction and maintenance data is included in Appendix A.

c. Validity

The field inspection appears to substantiate the available plans and sections to the extent that could be determined by visual observations.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The visual inspection made of New Street Reservoir Dam did not reveal any signs of distress in the dam or appurtenances. The dam appeared to be in reasonably good condition and adequately maintained.

b. Dam

All construction joints appeared to be tight. No serious structural cracking was observed, however, numerous small cracks were visible in many of the arches, the majority occurring between 5 to 15 feet from the crest. Most noticeable was the leaching which has occurred through the concrete. In some arches the deposits were quite sizeable. No water was observed flowing from any of the cracks or joints. The gunite coating on the upstream face was in good condition with only some minor spalling on arches near the right abutment.

Construction joints between buttress cap beams and shell were all tight with no evidence of movement. No indications of any change in horizontal or vertical alignment were apparent anywhere in the structure.

No signs of erosion, sloughing or local instability were readily apparent in the embankment section.

Basalt crops out on the right abutment, spillway discharge channel and in the interceptor ditch skirting the left reservoir rim. Rock ridges were noted in the upper limit of the reservoir. Basalt rock is the foundation of the dam.

No seepage in the foundation rock was observed. There was no indications of seepage anywhere immediately downstream of the dam.

c. Appurtenant Structures

The spillway was in excellent condition with no signs of cracking or spalling. The 2 foot by 3 foot rectangular outlet conduit appeared to be free of debris. All stoplogs were in place at the time of the inspection. One dead tree was down on the right abutment slope which constitutes the spillway approach, and threatens to block the spillway. A cluster of 6-inch diameter trees stand 6 to 7 feet downstream of the outlet. No erosion protection exists between the rectangular outlet and the diversion ditch.

d. Reservoir Area

The reservoir rim is gently sloped and no indications of instability were readily apparent. Minimum slopes were about 5H to 1V and maximum vertical slopes were 1.7H to 1V. The entire rim was heavily covered with gravel and cobbles. The slopes above the reservoir are heavily wooded.

e. Downstream Channel

No downstream channel, as such, exists, rather, the end of the interceptor ditch over the right abutment functions to carry off any spillway discharges. A significant portion of the ditch is bedrock. The end of the ditch is a 10 foot wide by 2 foot deep concrete channel which discharges into a natural brook channel flowing under the bridge for New Street. The bridge is about 100 feet downstream of the dam.

3.2 Evaluation

At the time of the inspection the dam did not exhibit any signs of distress. The abutments appeared to be in good condition. Overall, the dam appears to be in good condition. Reservoir slopes show no apparent signs of instability and are not believed a potential hazard to the dam.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

Because the New Street Reservoir Dam is used to store water for the Passaic Valley Water Commission, the policy is to fill the reservoir during periods of low water demand and draw water as needed during periods of high demand. Thus, water is released normally only through the Little Falls Pumping Station. The spillway releases excess flow during storms after the reservoir has been filled.

4.2 Maintenance of the Dam

The dam is under surveillance by the Little Falls Pumping Station personnel. Repairs are made by the Passaic Valley Water Commission as they deem necessary.

4.3 Maintenance of Operating Facilities

Regular maintenance of the valves and equipment in the water supply line is performed by personnel of the Passaic Valley Water Commission.

4.4

Evaluation

Maintenance of the facility is in the hands of the Passaic Valley Water Commission. The procedures are on a simple, as-needed basis. In view of the greater public interest in dam safety, the following procedures should be initiated.

1. An annual visual inspection of the dam utilizing the Corps of Engineers check list conducted by the Commission's engineering representative.
2. Formal logging of maintenance at dam, be it repairs, inspection or reservoir dredging.
3. A warning system and evacuation plan should be implemented by the owner and local authorities in case of an emergency situation.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design

The drainage area of 0.020 square miles above New Street Dam consists essentially of the reservoir surface area. A drainage map of the watershed of New Street damsite is presented on Plate 1, Appendix D.

The evaluation of the hydraulic and hydrologic features of New Street Reservoir Dam was based on criteria set forth in the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, and additional guidance provided by the Philadelphia District, Corps of Engineers. The Probable Maximum Flood (PMF) volume was calculated from the Probable Maximum Precipitation (PMP) using Hydrometeorological Report No. 33. Because the reservoir surface area is essentially the entire drainage basin, no PMF hydrograph was calculated. Instead, the 48 hour PMF volume was assumed equal to the 48 hour PMP covering the reservoir surface. The computed flood volume of the PMF is 27.3 acre-feet; one-half the PMF is 13.7 acre-feet. Since the reservoir storage volume of 36.5 acre-feet between the spillway crest and the dam crest is larger than the PMF volume, no reservoir routing was performed.

The stage-outflow relation for the spillway was prepared from field notes, sketches and limited construction drawings. The reservoir stage-capacity data were based on the U.S.G.S. quadrangle topographic maps. The reservoir stage-

capacity curve includes reservoir levels exceeding the top of the dam to allow for surcharge conditions. The spillway and overtop rating curve was prepared up to Elevation 304.5. In the comparison of reservoir storage and inflow volume, the discharge through the spillway and outlet facilities was excluded due to its insignificant magnitude. The spillway and overtop rating curve and the reservoir capacity curve are presented in Plates 2 and 3 of Appendix D, respectively.

b. Experience Data

Records of reservoir level and spillway discharge are maintained for this site. The reservoir level is regulated from Little Falls Pumping Plant. However, according to interviews with local residents, the maximum reservoir level was occasionally higher than the dam crest due to excessive pumping from the Little Falls Pumping Plant.

c. Visual Observations

The very small watershed and reservoir is located in a relatively wooded area. There is no evidence of excessive sedimentation due to recent developments.

d. Overtopping Potential

As indicated in Section 5.1-a., the reservoir storage volume above the spillway crest is capable of storing the 48 hour PMF without overtopping the dam.

According to the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers, one-half the PMF is the minimum Spillway Design Flood (SDF) for this dam. The spillway capacity of the New Street Reservoir is, thus, considered adequate as far as the natural PMF event is concerned. However, excessive pumping into the reservoir from the Little Falls Pumping Plant must absolutely be avoided to prevent overtopping in this manner.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

At the time of the inspection there were no readily apparent signs of instability in the structure. The foundation and abutments also appeared structurally competent. Close examination of the shells did not reveal structural cracks indicating either structural inadequacy or differential settlement of buttresses. No evidence of movement along the joint between the shells and buttresses could be found. No spalling or rust stains were found indicating no corrosion of reinforcement.

b. Design and Construction Data

No design data or computations and no materials tests or records of construction were available.

c. Operating Records

No operating records are available relating to the stability of the dam.

d. Post-Construction Changes

As discussed in Section 1.2, the only known post-construction changes made were the reinforcement of abutments Nos. 3 through 7 with 55 cubic yards of concrete and the addition of 3,092 cubic yards of earthfill in the area down-

stream of the dam. Both of these changes would increase the safety of the dam against a sliding failure.

e. Static Stability

The depth of the concrete cutoff and of the footings under the buttresses along with the strength of the rock foundation will have a profound affect upon the stability of the structure against sliding. Also, the depth of backfill against the toe of the dam will also aid the sliding stability of the dam. None of this information is presently available and, therefore, it is not possible to make a definitive statement on the sliding stability of the mulitple arch dam. However, approximate calculations of sliding stability indicated that small or possibly no reliance on the backfill or concrete cutoff was required for stability against sliding with the reservoir level at the crest. Similar approximate calculations of overturning stability indicated the structure should have ample stability against overturning. Stability calculations are contained in Appendix E.

f. Seismic Stability

A north-south trending fault, mapped by others, occurs about 1,000 feet from the dam. The dam is located in Seismic Zone 1, as defined in Recommended Guidelines For Safety Inspection of Dams as prepared by the Corps of Engineers. In general, projects located in Seismic Zones 0, 1 and 2 may be assumed to present no hazard from earthquake, provided the static stability conditions are satisfactory and conventional safety margins exist.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety

The dam has been inspected visually and a review has been made of the available engineering data. This assessment is subject to the limitations inherent in the visual inspection procedures stipulated by the Corps of Engineers for a Phase I report.

The spillway capacity of the New Street Reservoir is considered adequate *as far as the PMF event is concerned*. Excessive pumping into the reservoir, however, from the Little Falls Pumping Station must absolutely be avoided to prevent overtopping of the dam.

No definitive statement pertaining to the safety against sliding of the dam can be made without acquisition of information on depth of concrete cut-off and earthfill. However, approximate calculations did not indicate great reliance on these features for stability. The approximate calculations did indicate the dam should have ample safety against overturning. These conclusions are reinforced by the apparent satisfactory performance of the dam during its life.

b. Adequacy of Information

The information and data uncovered is not adequate to perform a comprehensive, definitive evaluation of the dam's stability. Nevertheless, in view of the past performance of the dam, its present condition, and in light of stability calculations performed, it is not felt that additional information on the engineering properties of the embankment and foundation materials is necessary at this time.

c. Urgency

No remedial measures or studies of an urgent nature are considered necessary.

7.2 Remedial Measures

a. Alternatives

To prevent future accidental incidents of overtopping some of the stoplogs presently in the spillway could be removed. A sufficient number of boards would have to be removed so that spillway discharge could not be exceeded by pumping from the Little Falls Pumping Station.

b. O & M Procedures

The owner should initiate a program of annual inspections of the dam utilizing the standard visual check list in this report. Headwater and tailwater gages should be installed in the dam and read out during severe rainstorms and at routine operating and maintenance visits to the dam. A permanent log should be kept of all maintenance and operating events of the dam, the lake and the outlet passages.

7.3

Recommendations

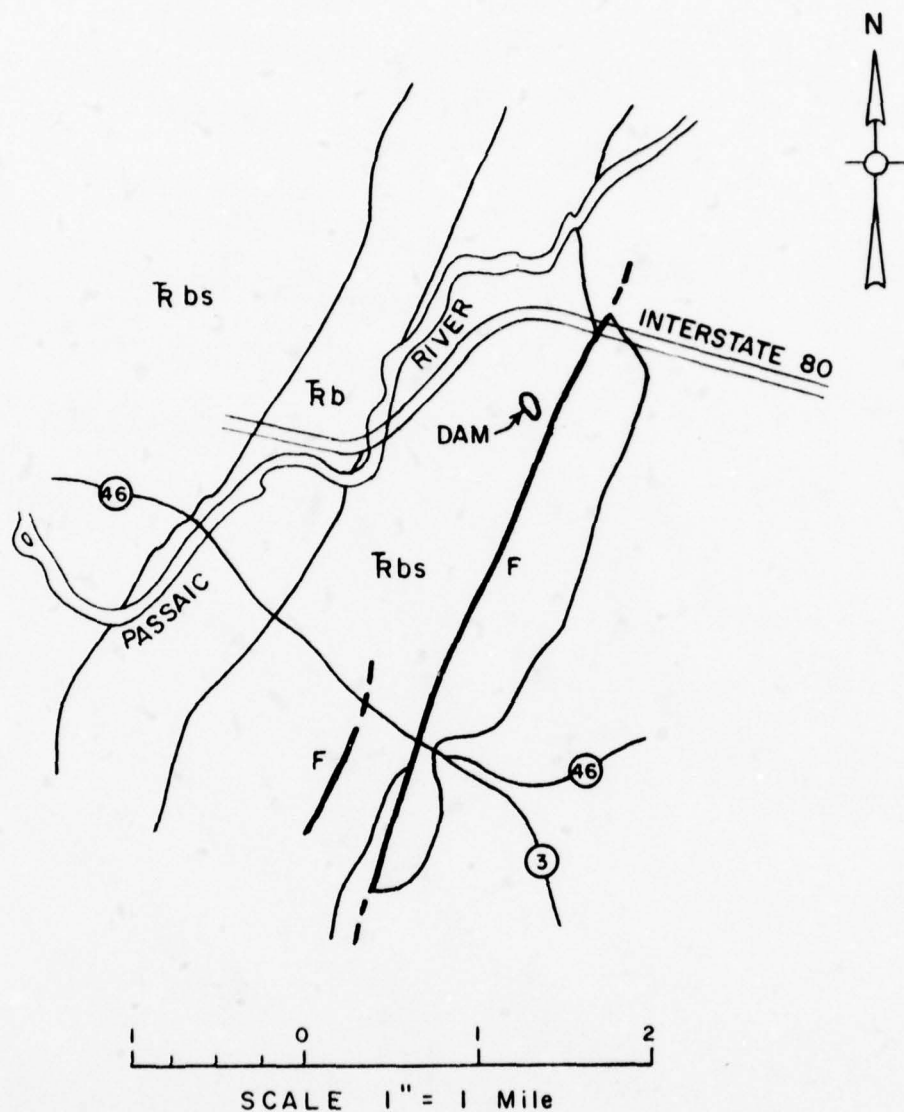
Based on the visual inspection and data evaluation presented herein, the following action is recommended.

1. The owner should install a high level alarm and pump shut-down control on the reservoir to prevent recurrences of overtopping the dam by pumping.
2. The upstream face of the dam should be waterproofed by application of gunnite, chemicals or membrane coatings to prevent leakage and possible further leaching of concrete in arch shells. Chemical analysis of the leach deposits should be made to determine if they are formed from concrete leaching or dissolved chemicals in the water.

PLATES



VICINITY MAP

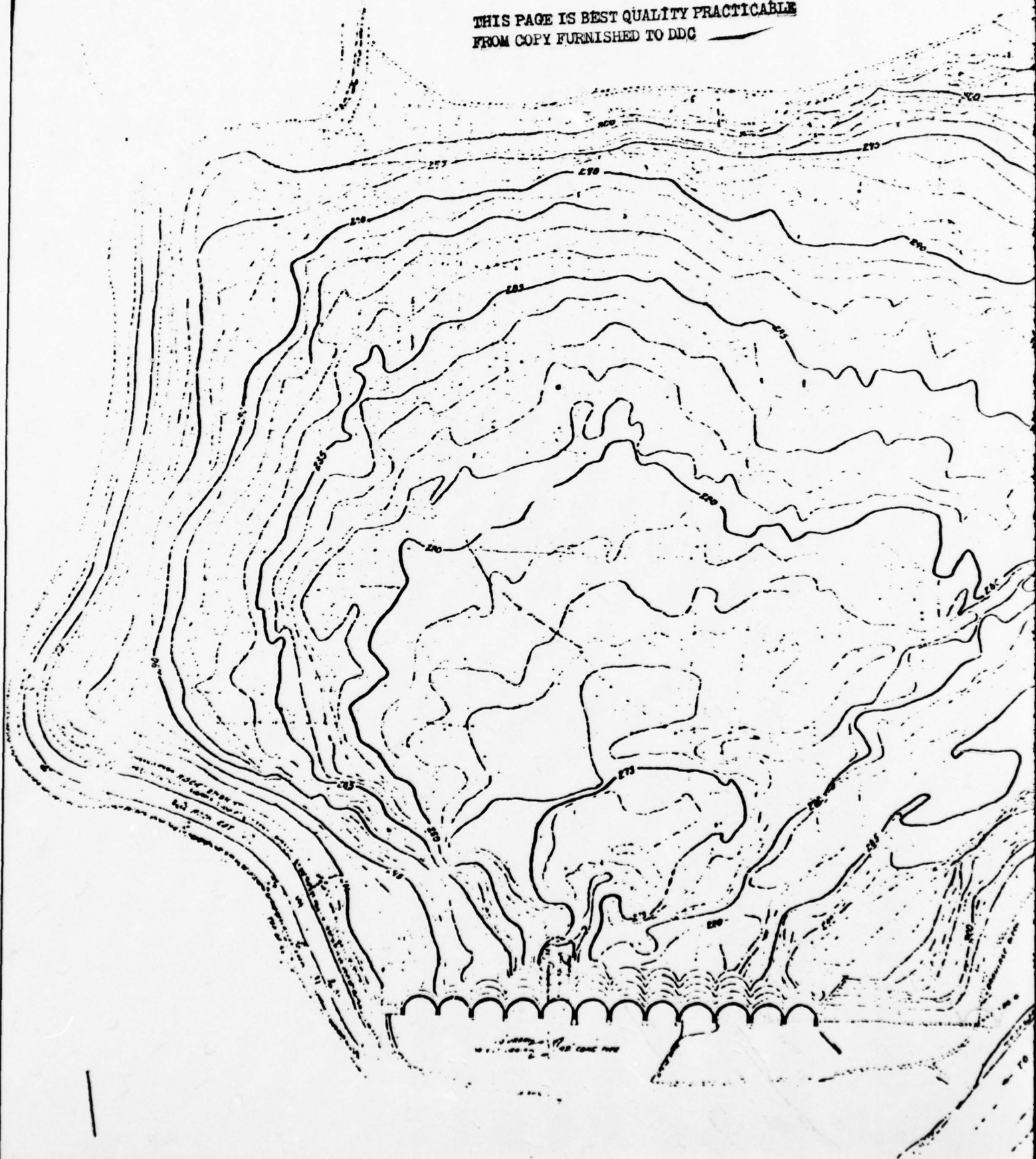


LEGEND

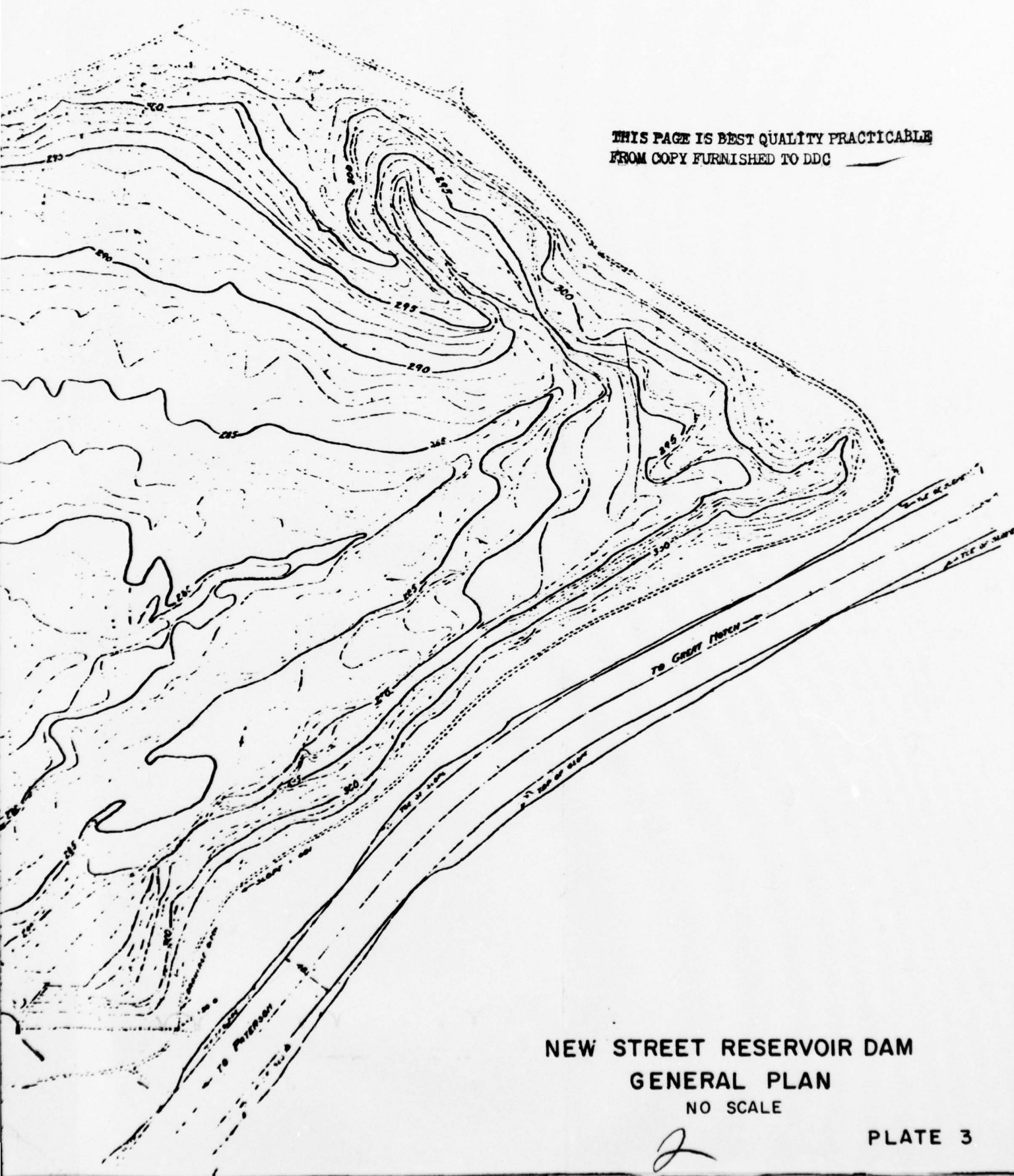
- $\bar{R}b$ BRUNSWICK FORMATION
RED SANDSTONE WITH INTERBEDS OF SOFT, RED SHALE.
- $\bar{R}bs$ BASALT
- F FAULT

GEOLOGIC MAP NEW STREET DAM

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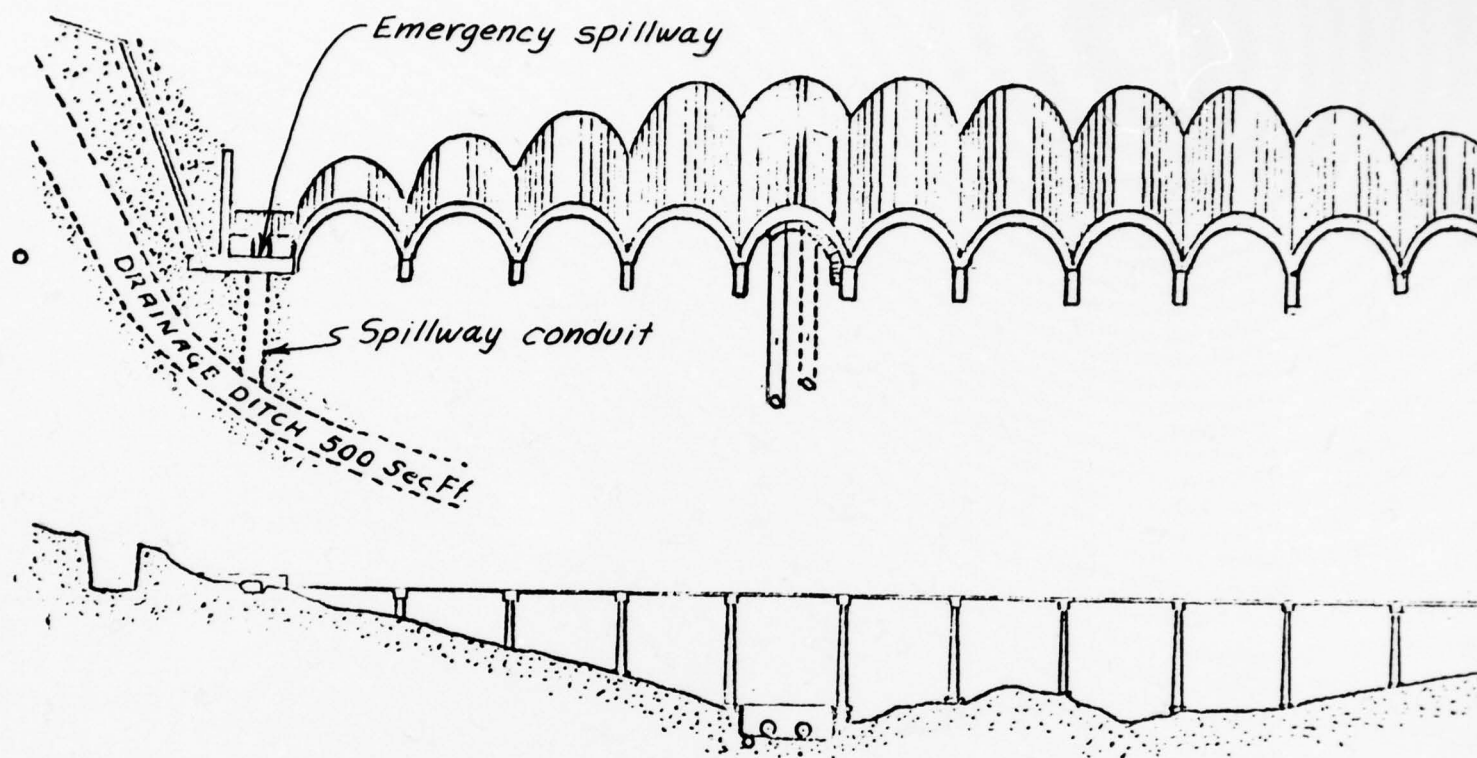


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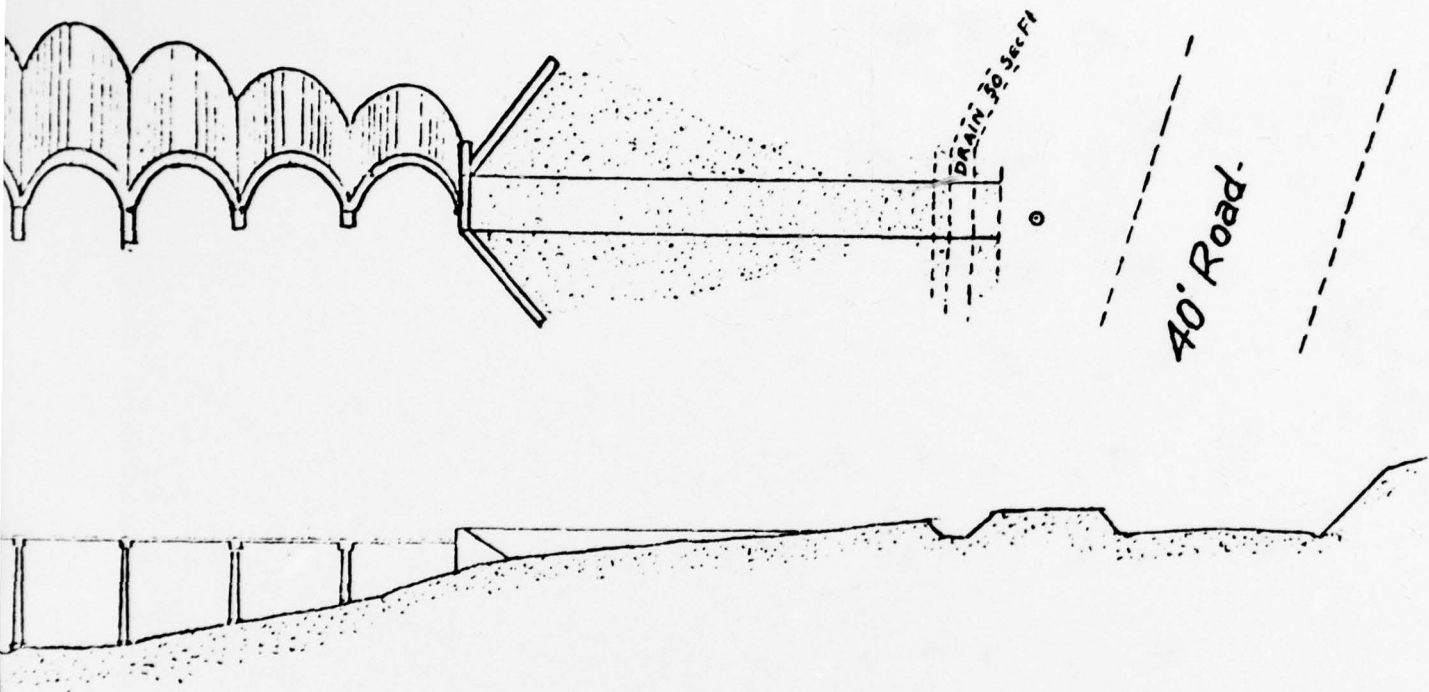
NEW STREET RESERVOIR DAM
GENERAL PLAN
NO SCALE

PLATE 3



Total Length of Dam	449.8'
Length of Multiple Arch Section	300.0'
" of Core Wall & Embankment "	121.3'
" of Gravity "	28.5'
Cubic Yards Exca Earth	
" " " Rock	
" " Back Fill & Embank.	

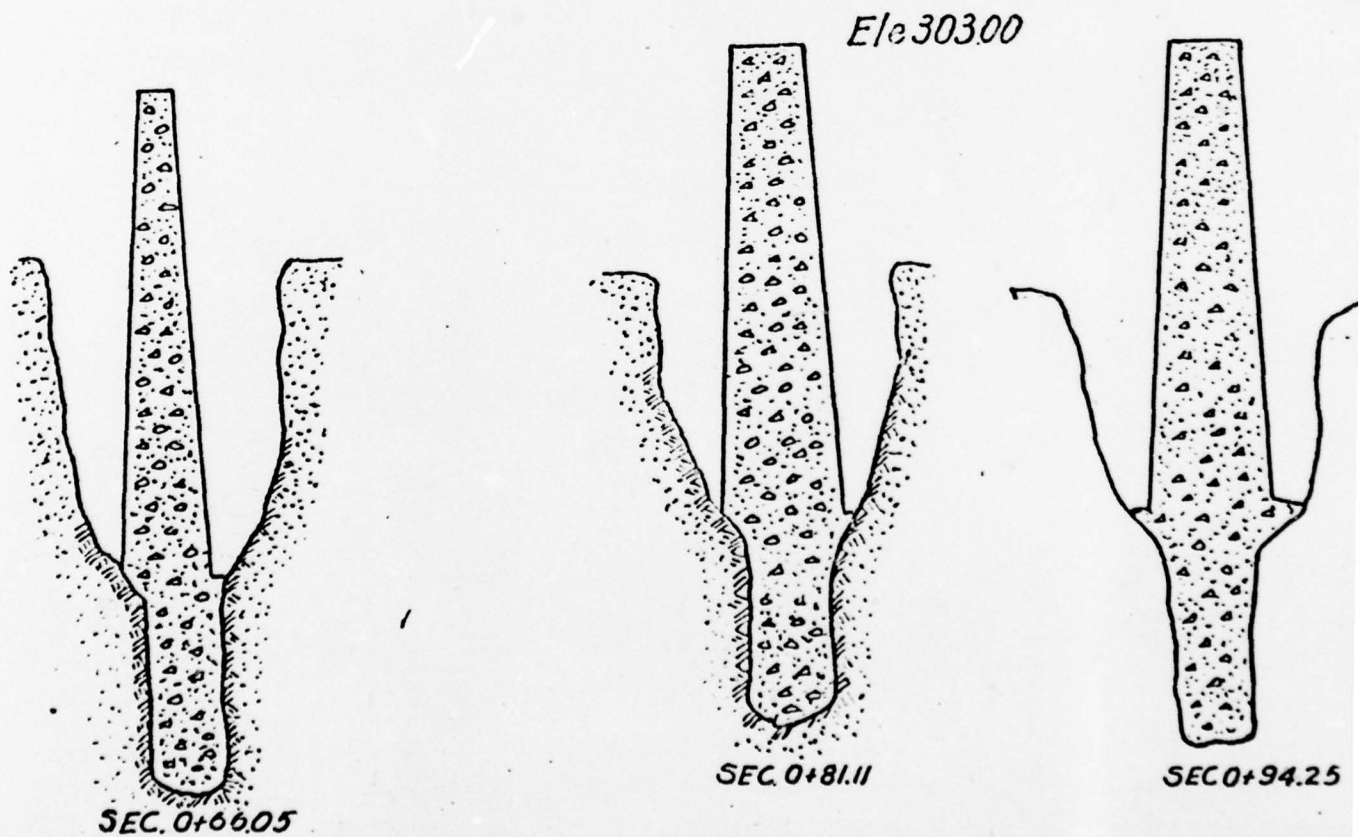
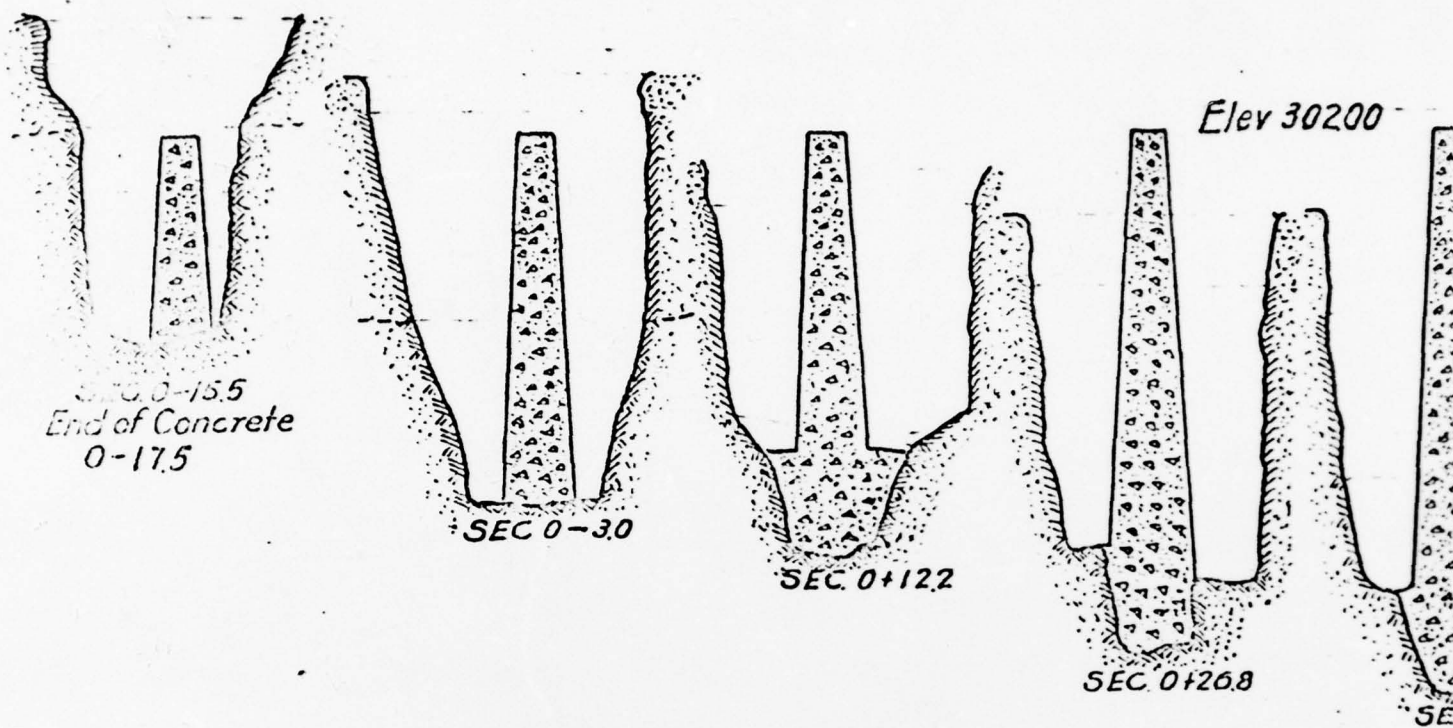
PAS



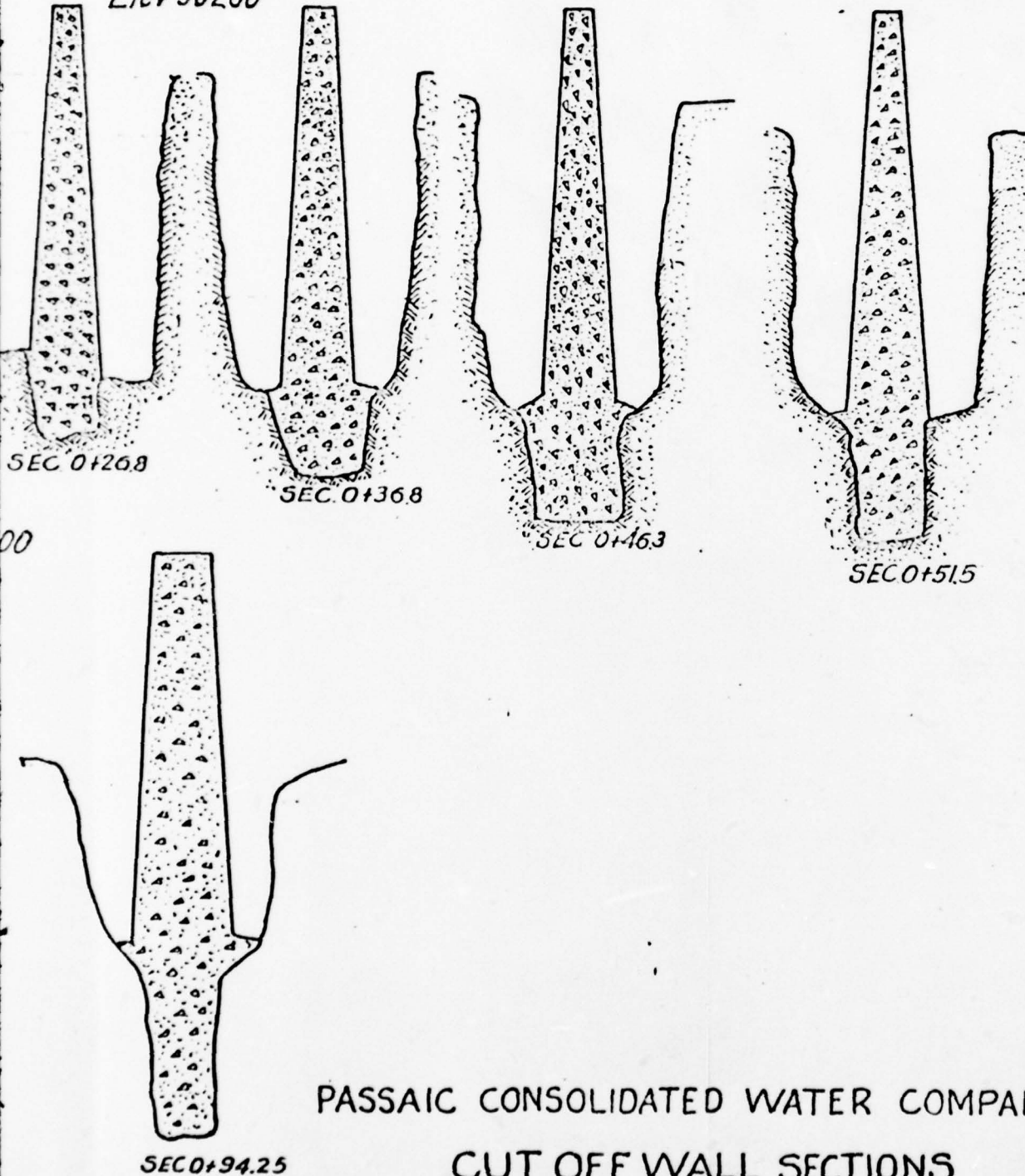
PASSAIC CONSOLIDATED WATER CO
MULTIPLE - ARCH DAM

2

PLATE 4



Elev 30200



PASSAIC CONSOLIDATED WATER COMPANY
CUT OFF WALL SECTIONS

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FROM COPY FURNISHED TO DDC

NEW STREET RESERVOIR

Multiple Arch Dam

Spillway

72" CONC. MAIN

SQUIRE

WOOD RD.

SLIPPERY RD.

Drainage Ditch

RIFLE CAMP RD.

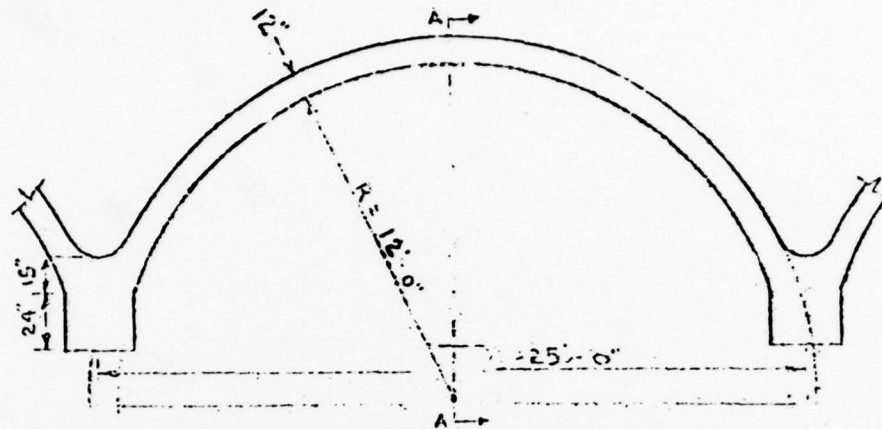
PLAN

ELEVATION

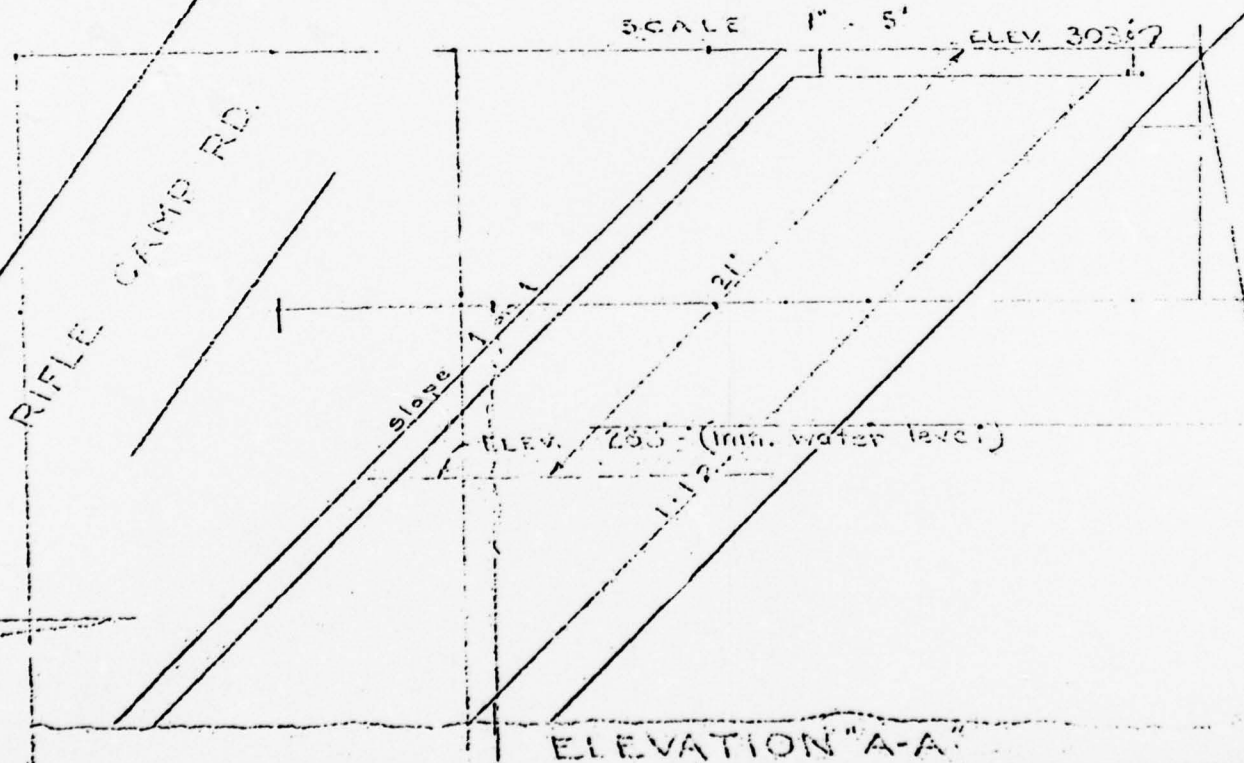
SCALE 1" = 40'

PASSAIC
ENGINEER
REPAIR
SCALE: A.S.S.

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FROM COPY FURNISHED TO DDC

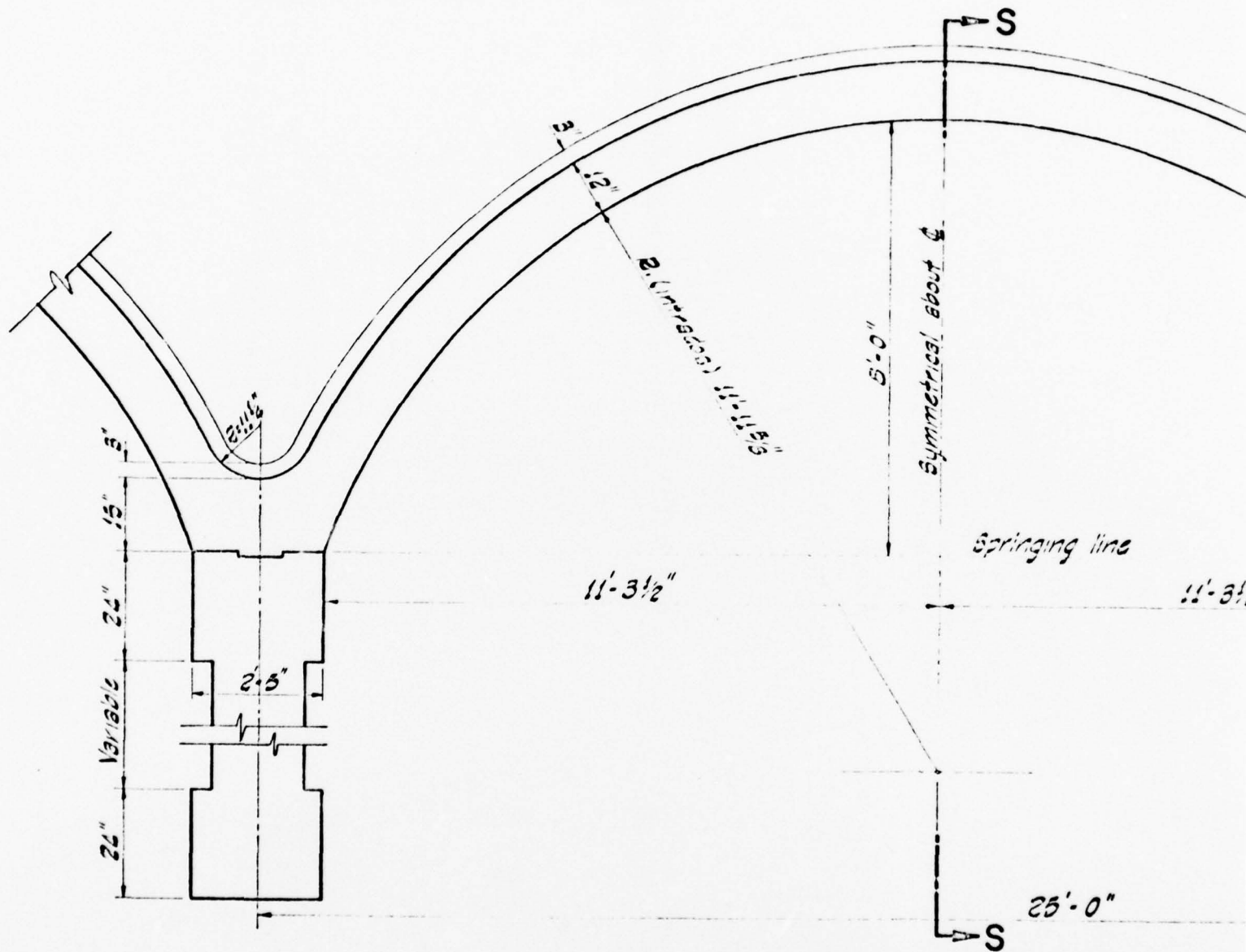


DETAIL PLAN OF ARCH

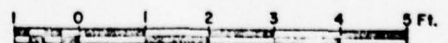


PASSAIC VALLEY WATER COMMISSION
ENGINEERING DEPT. CLIFTON, N. J.
REPAIR OF NEW STREET RESERVOIR DAM WEST PATERSON.
SCALE: AS SHOWN L. C. APRIL 18, 1965

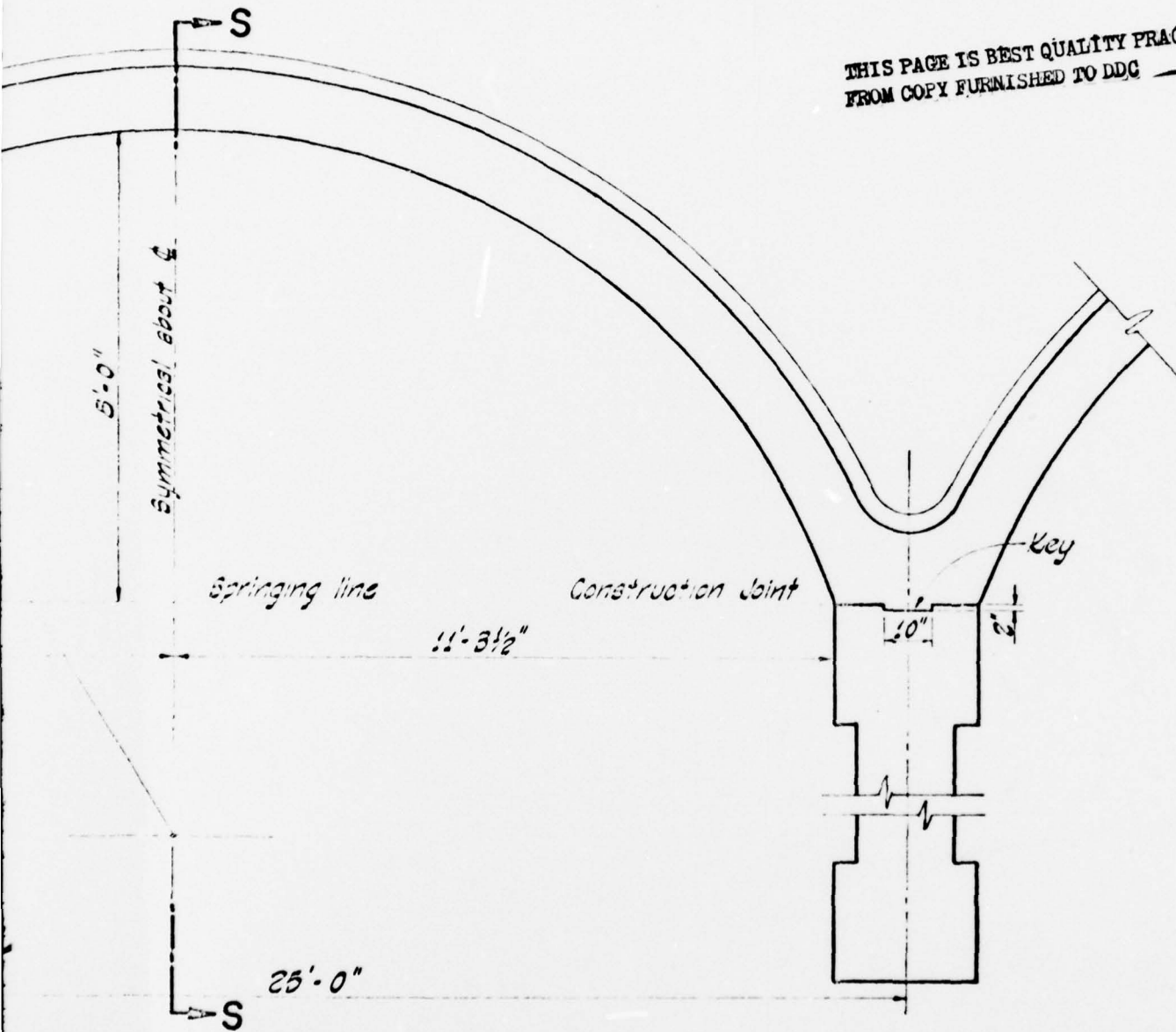
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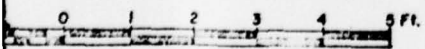
SECTION N-N



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FROM COPY FURNISHED TO DDG



SECTION N-N

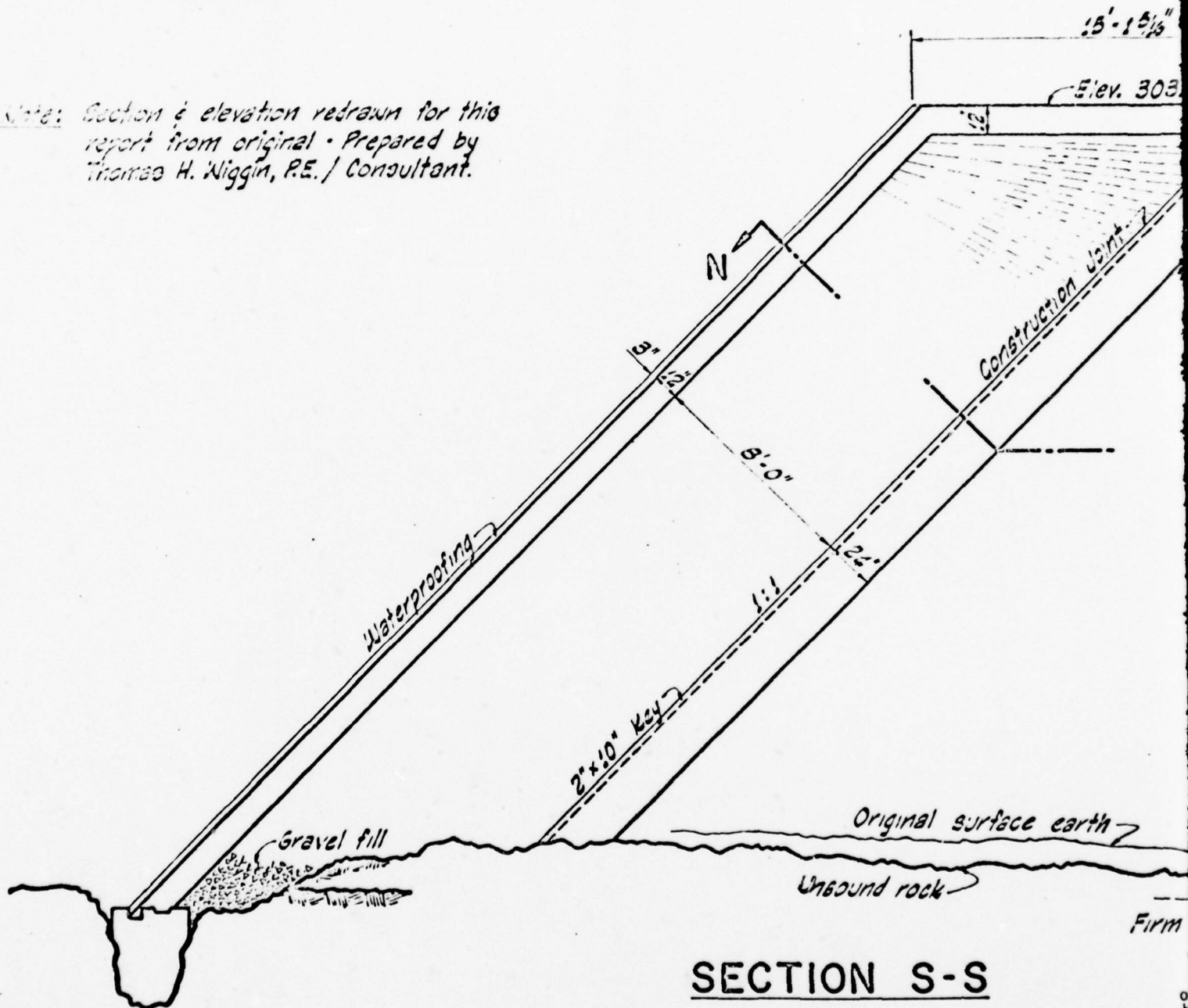


Note: Section redrawn for this report from original -
Prepared by Thomas H. Wiggins, P.E., Consultant.

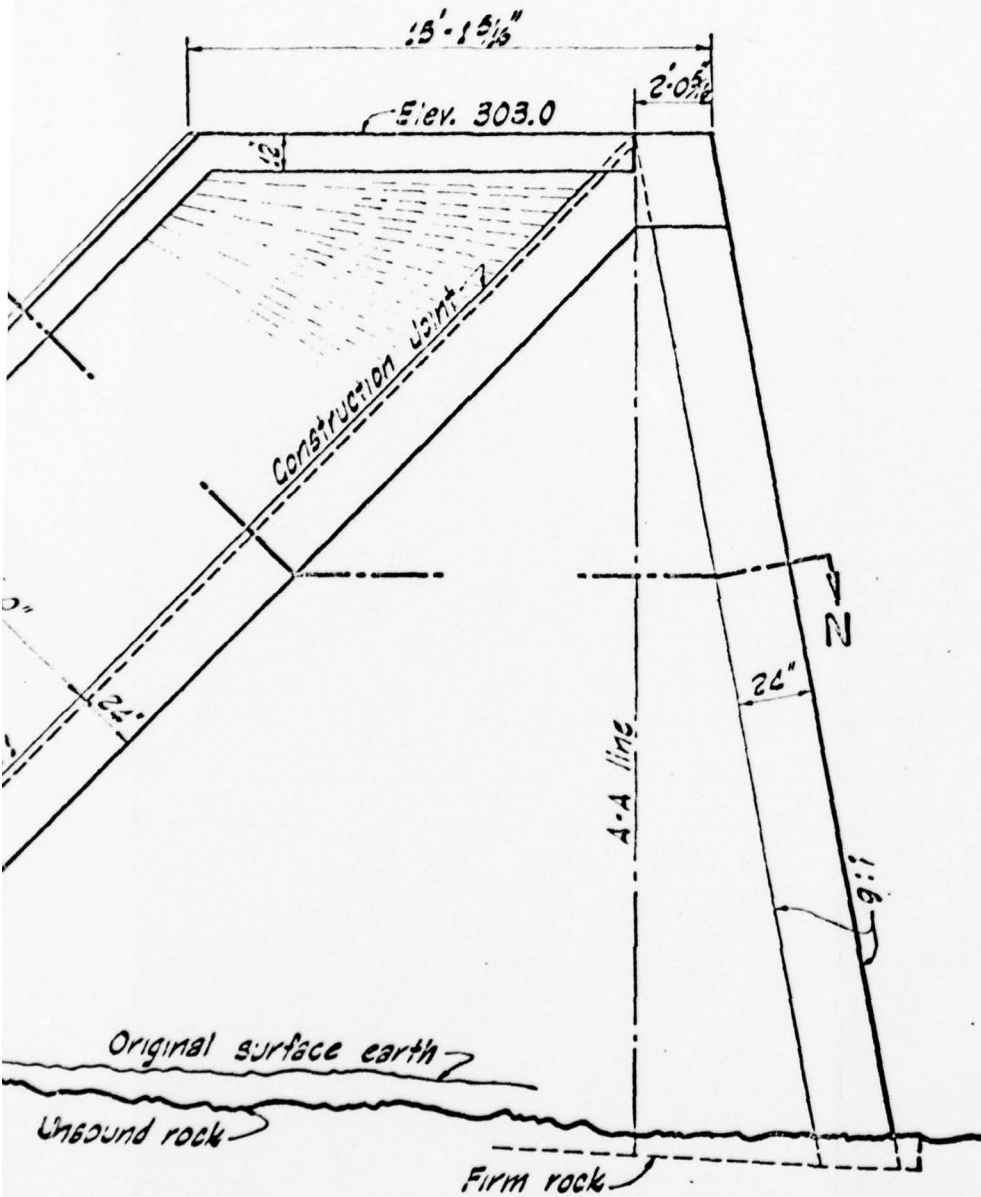
2

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FROM COPY FURNISHED TO DDC

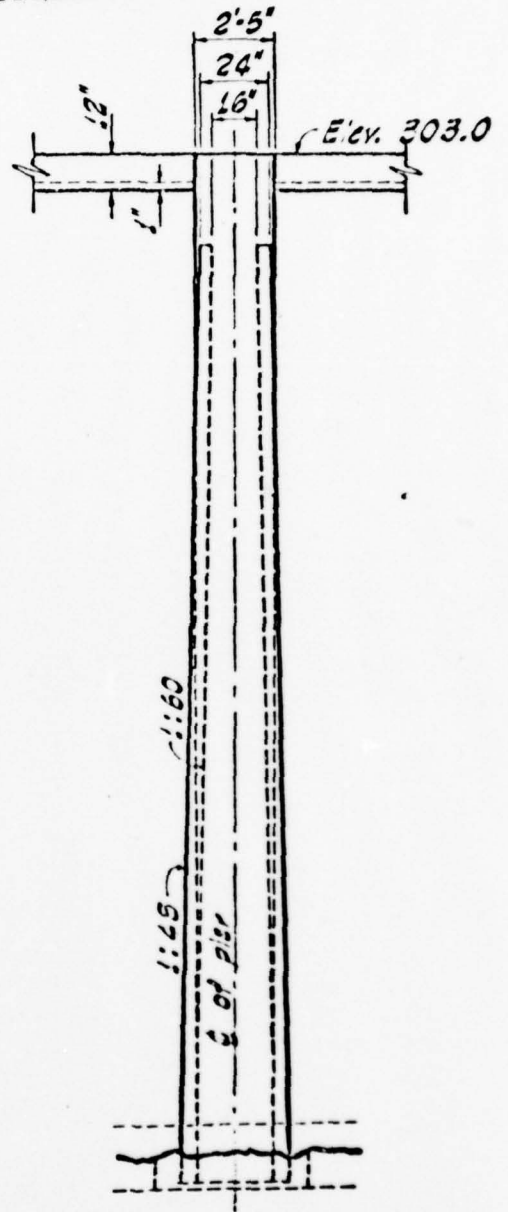
Note: Section & elevation redrawn for this
report from original. Prepared by
Thomas H. Wiggins, P.E. / Consultant.



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FROM COPY FURNISHED TO DDC

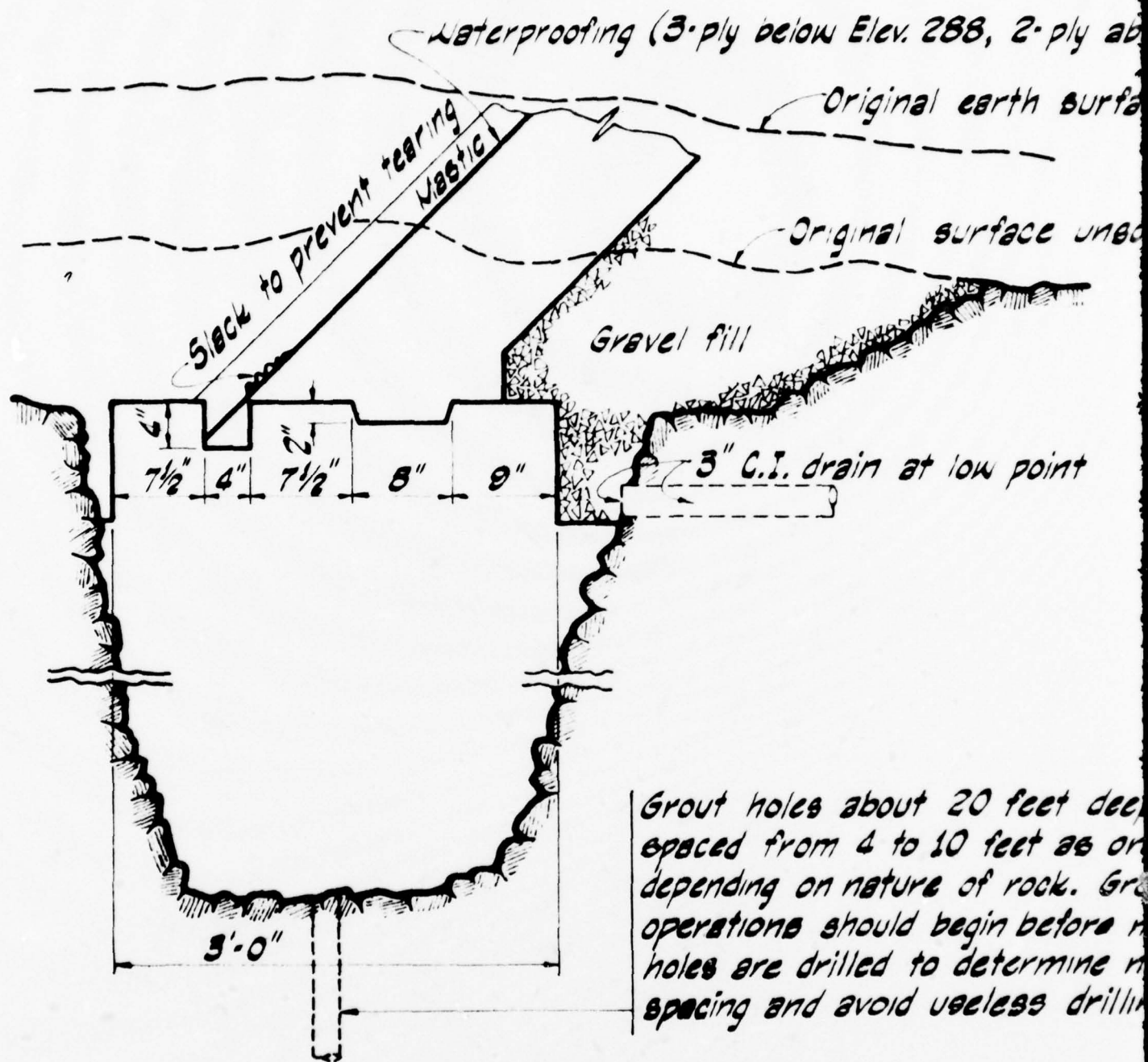


TION S-S

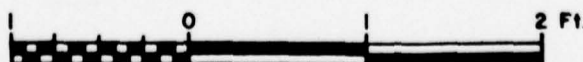


REAR ELEV.

2

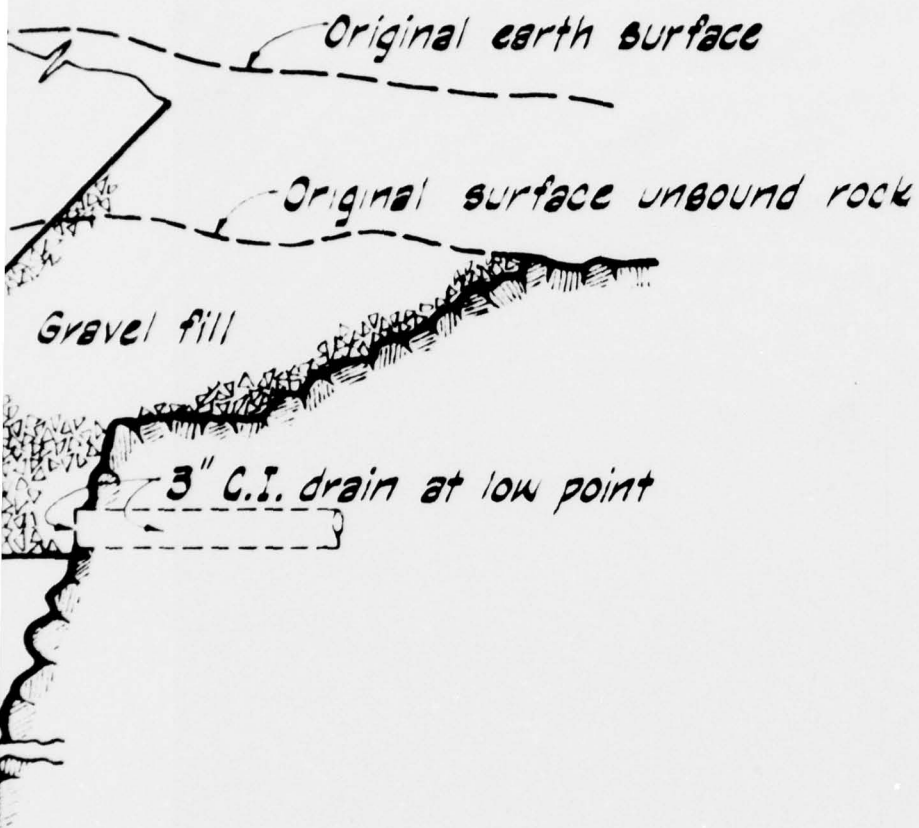


DETAIL OF ARCH CUT-OFF



Note

ofing (3-ply below Elev. 288, 2-ply above)

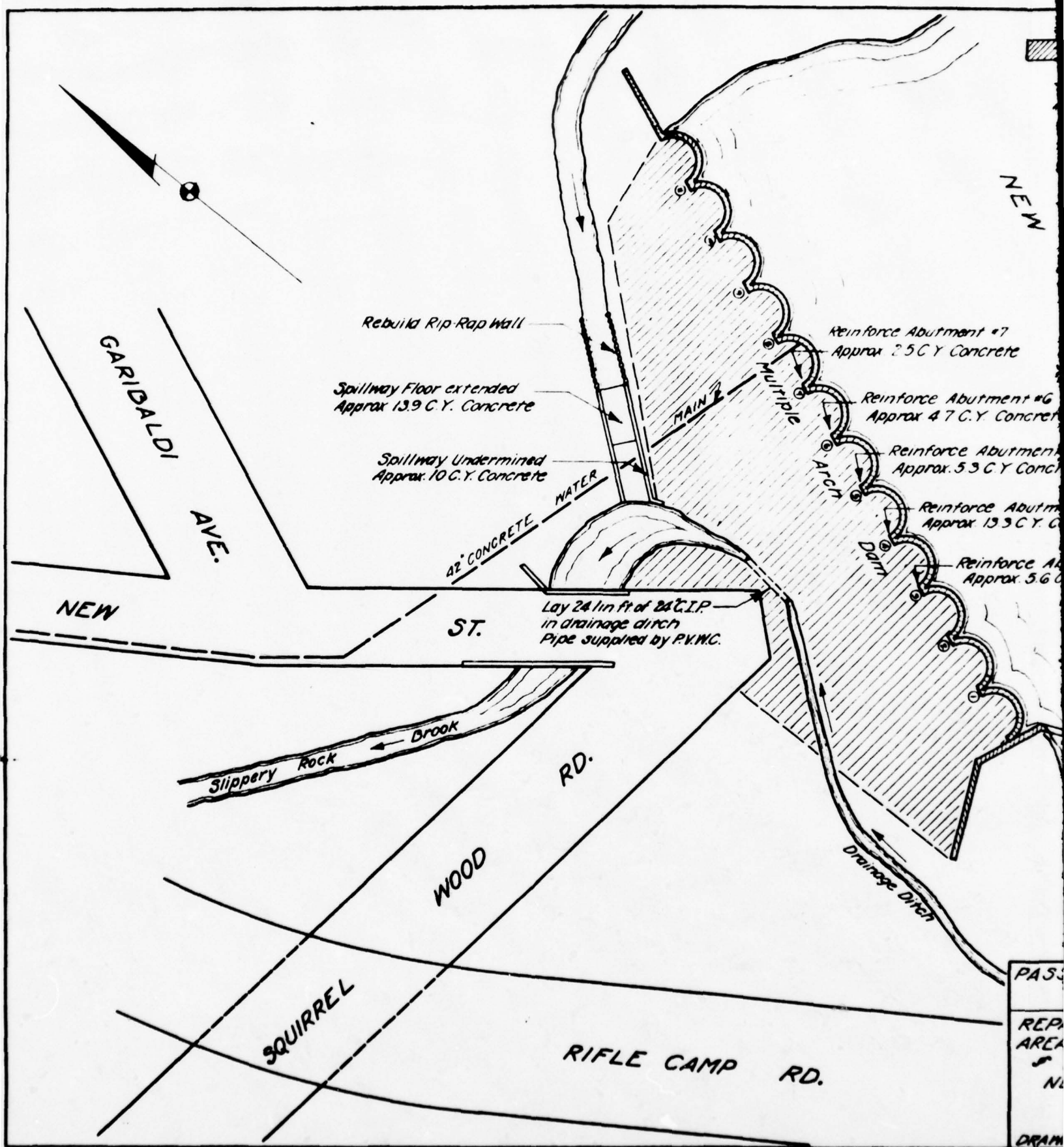


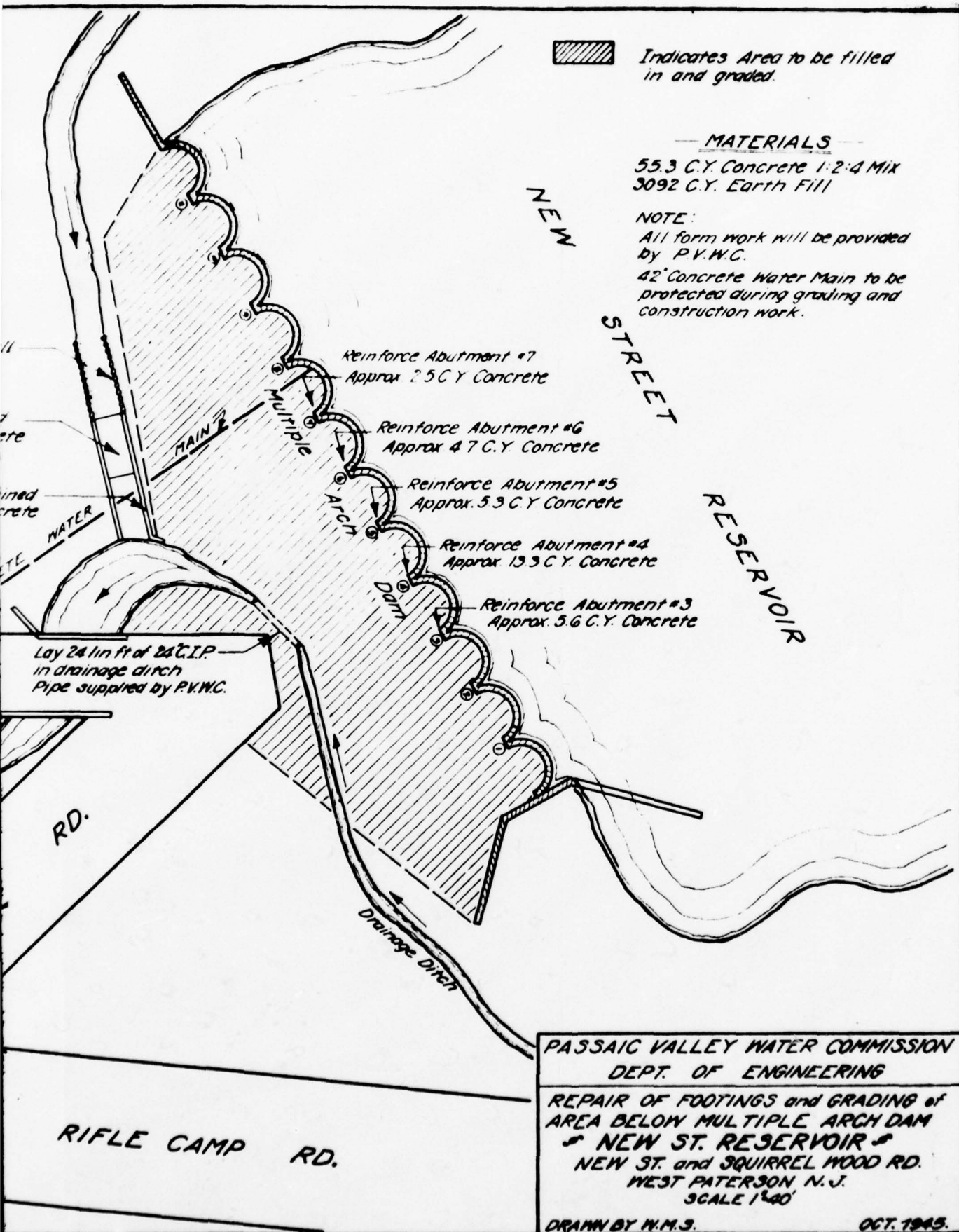
Grout holes about 20 feet deep
spaced from 4 to 10 feet as ordered
depending on nature of rock. Grouting
operations should begin before many
holes are drilled to determine needed
spacing and avoid useless drilling.

ARCH CUT-OFF



Note: Detail redrawn for this report
from original - Prepared by
Thomas H. Wiggin, P.E. / Consultant.





APPENDIX A

CHECK LIST - VISUAL OBSERVATIONS

CHECK LIST - ENGINEERING, CONSTRUCTION
MAINTENANCE DATA

CHECK LIST

Visual Inspection
Phase I

Name Dam New Street Reservoir County Passaic State New Jersey Coordinators _____

Date(s) Inspection June 30, 1978 Weather Clear-Warm Temperature 80°F

Pool Elevation at Time of Inspection El. 292 M.S.L. Tailwater at Time of Inspection None M.S.L.

Inspection Personnel:

(June 30, 1978)

Joe Sirianni

(June 30, 1978)

William Flynn

(July 7, 1978)

Yin Au-Yeung

Henry King

Lynn Brown

David Kerkes

Robert B. Campbell Recorder

Owner Representative:

(June 30, 1978)

George Bednarz, Supervisor Pumping-Generating Operations
Passaic Valley Water Commission
1525 Main Avenue
Clifton, New Jersey

CONCRETE/MASONRY DAMS

New Street Reservoir

Type - Concrete Multiple-Arch and Buttress Dam

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	No seepage can be found downstream of dam. Numerous seepages through concrete in arches are evident. Much deposit has built-up in some arches. (See attached sheet.) Deposits appear to be dry but cannot tell how old deposits are.	Inspect all arches annually to detect wet or growing deposition. Gunite or water-proof upstream face of arches showing seepage or growing depositions. Make photo survey for future comparison.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Abutments appear excellent. No evidence of abutment erosion could be found. Very minor erosion is evident behind first three buttresses on left abutment resulting from recent overtopping of dam due to pumping plant operator error.	See Reservoir Operation.
DRAINS	None.	
WATER PASSAGES	None.	
FOUNDATION	Dam appears to be found on rock. No evidence of wet areas or seepage can be found.	Brush and small trees should be cleared out between buttresses and under arches.

CONCRETE/MASONRY DAMS

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Gunite coating in good condition on upstream facing. Some minor spalling on arches near right abutment.	Spalled gunite should be repaired. See notes under leakage.
STRUCTURAL CRACKING	See notes on attached sheet.	
VERTICAL AND HORIZONTAL ALIGNMENT	No evidence of movement of the structure could be found.	
MONOLITH JOINTS	The joints between arches not visible for inspection but gunite facing does not indicate movement or separation.	
CONSTRUCTION JOINTS	Construction joints between buttress cap beams and shells are all tight and show no evidence of movement or distress. No evidence of rust stains can be found on the concrete surfaces except beneath the ships ladder and metal platform.	

EMBANKMENT

New Street Reservoir

Type - Rolled Fill

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	None	
RIPRAP FAILURES	None	

EMBRANKMENT

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	None	
ANY NOTICEABLE SEEPAGE	None	
STAFF AND GAGE RECORDER	Staff gage located at the upstream slope of the reservoir.	
DRAINS	None	

OUTLET WORKS

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet is large diameter (42-inch) steel pipeline directly connected to Little Falls Pump Station.	
INTAKE STRUCTURE	Submerged and not visible. Cannot be inspected. Concrete guides on face of arch indicate twin openings at bottom of fifth arch from right abutment. Guides have been gunnited over so no longer possible to use them to raise or lower trash racks.	
OUTLET STRUCTURE	N.A.	
OUTLET CHANNEL	N.A.	
EMERGENCY GATE	N.A.	

UNCATED SPILLWAY

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Two 4' wide by 3' high weirs with stoplogs. Discharge drops into 2' x 3' rectangular conduit and concrete in very good condition; no spalling.	To avoid accidental overtopping from pumped storage, stoplog should be removed from each section.
APPROACH CHANNEL	Shore along right abutment: dead tree lying upstream of spillway.	Clear debris upstream of spillway.
DISCHARGE CHANNEL	No erosion protection. Obstructed by cluster of 6" trees 6-7' from outlet. Flows into 2' x 10' cone chute which carries discharge from Barber Pond.	Remove trees and install erosion protection.
BRIDGE AND PIERS	None.	

GATED SPILLWAY
(None)

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N.A.	
APPROACH CHANNEL	N.A.	
DISCHARGE CHANNEL	N.A.	
BRIDGE AND PIERS	N.A.	
GATES AND OPERATION EQUIPMENT	N.A.	

INSTRUMENTATION

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	Staff gage on left abutment of dam. Automatic recorder for reservoir elevation is located in Little Falls Pumping Station.	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

RESERVOIR

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Upper slopes gently sloping and heavily wooded. Shoreline slope varies, minimum 5H to 1V to maximum 1.7H to 1V Good angular cobble and coarse gravel protection.	
SEDIMENTATION	No drainage into reservoir. Interceptor channels have been constructed around each side of reservoir to direct surface runoff around the lake and dam. No evidence of sediment can be found.	
SHORELINE STRUCTURES	No dwellings or structures on shorelines. Land around reservoir is owned by Passaic Valley Water Commission.	
USE	Regulating storage reservoir for municipal water supply system. Level varies daily and weekly according to demand and pumping.	
OPERATION	Reservoir is filled and drained through the municipal water distribution system. Level varies daily and weekly according to demand and pumping. The daily fluctuation usually is in the range of 3 inches to 2 feet. Malfunction of level gage caused overtopping of dam at night earlier this month. Reported to be rare occurrence. No automatic alarm.	An automatic alarm and pump shut-down control system should be installed on dam to prevent overtopping of dam.

DOWNSTREAM CHANNEL

New Street Reservoir

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Natural stream channel. Bridge for New Street is located 100 feet downstream of dam. Bridge is 20 feet long by 58 inches deep with approximately 7 feet between roadway and channel bottom. No debris in channel.	
SLOPES	Gentle sideslopes very heavily wooded.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	No dwellings between dam and Butchers Pond and Highland Lake, but there is heavy automobile traffic on Mountain Avenue.	

CHECK LIST
ENGINEERING DATA

DESIGN, CONSTRUCTION, OPERATION

New Street Reservoir

ITEM	REMARKS
PLAN OF DAM	Available.
REGIONAL VICINITY MAP	Available.
CONSTRUCTION HISTORY	None available. Owner's representative reported the dam was built in about 1925.
TYPICAL SECTIONS OF DAM	Available only for multiple arch section.
HYDROLOGIC/HYDRAULIC DATA	None available.
OUTLETS - PLAN)
- DETAILS) None Available.
- CONSTRAINTS)
- DISCHARGE RATINGS)
RAINFALL/RESERVOIR RECORDS	None Available.

CHECK LIST
ENGINEERING DATA

DESIGN, CONSTRUCTION, OPERATION
(Continued)

New Street Reservoir

ITEM	REMARKS
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS)
HYDROLOGY & HYDRAULICS) None available.
DAM STABILITY)
SEEPAGE STUDIES)
MATERIALS INVESTIGATIONS)
BORING RECORDS) None available.
LABORATORY)
FIELD)
POST-CONSTRUCTION SURVEYS OF DAM	None available.
BORROW SOURCES	Unknown.
SPILLWAY - PLAN)
- SECTIONS) None available.
- DETAILS)

CHECK LIST
ENGINEERING DATA

DESIGN, CONSTRUCTION, OPERATION
(Continued)

New Street Reservoir

ITEM	REMARKS
OPERATING EQUIPMENT PLANS AND DETAILS) None available.)
MONITORING SYSTEMS	None available.
MODIFICATIONS	Reinforcement of abutment Nos. 3 through 7 and regrading of area below dam in 1945.
HIGH POOL RECORDS	None available.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM - DESCRIPTION - REPORTS	Oral report of overtopping accident due to excess pumping into reservoir.
MAINTENANCE, OPERATION RECORDS	None available.

APPENDIX B

PHOTOGRAPHS

(All photos were taken on June 30, 1978.)

New Street Reservoir



Photo 1 - Upstream view of dam from right shoreline.

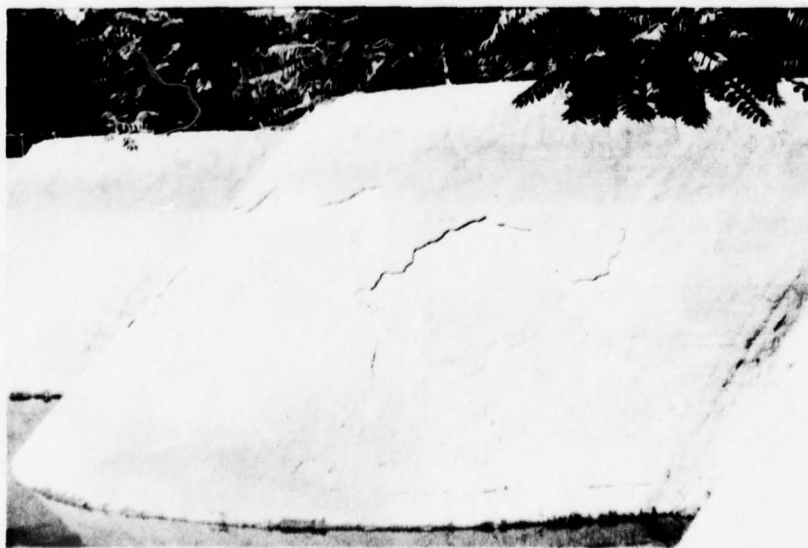


Photo 2 - View of spalled gunite on upstream surface of dam.

New Street Reservoir

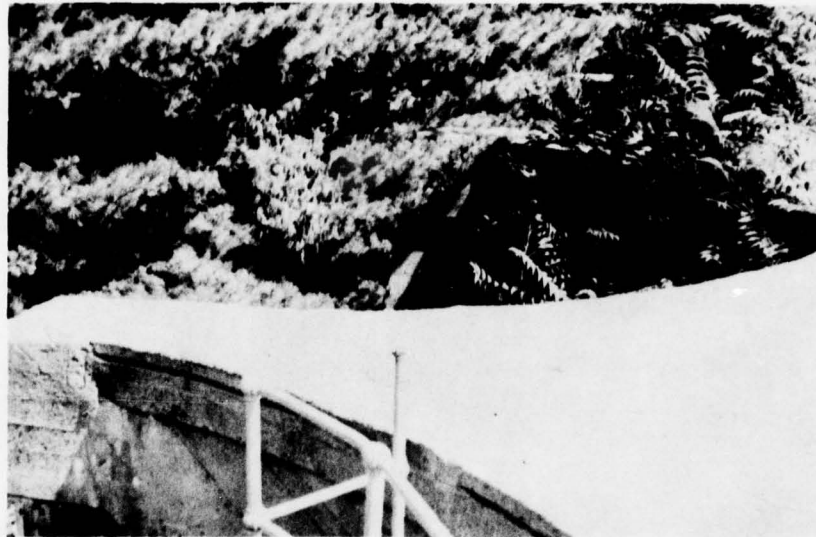


Photo 3 - View of top of arches and buttress.



Photo 4 - Downstream side of arch and buttress.

New Street Reservoir



Photo 5 - Underside of top of arch.



Photo 6 - View of back of buttress.

New Street Reservoir



Photo 7 - Leach deposits near top of arch slab.



Photo 8 - Close-up view of large leach deposit.

New Street Reservoir



Photo 9 - Close-up view of leach deposits.



Photo 10 - View of spillway outlet opening.



Photo 11 - View of spillway inlet box.

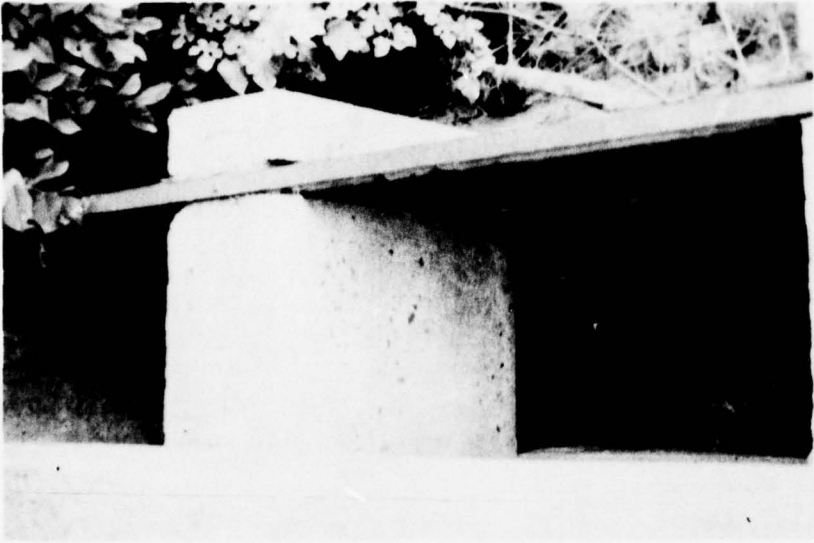


Photo 12 - View of stop boards in spillway box.

New Street Reservoir



Photo 13 - View in perimeter interceptor and by-pass channel to Barbour Pond showing vertical swing fence gate in channel.



Photo 14 - Spillway channel from spillway and Barbour Pond by-pass channel.

New Street Reservoir

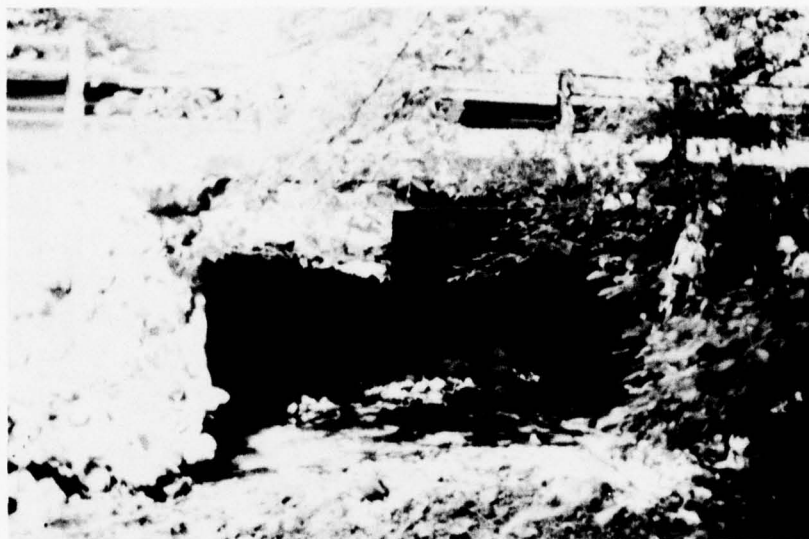


Photo 15 - Downstream discharge channel and Squirrel Road bridge.

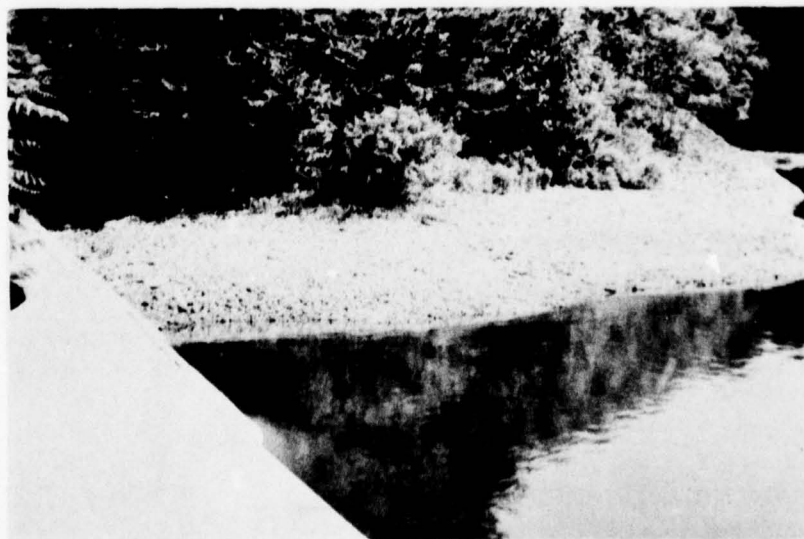


Photo 16 - Right abutment slope showing riprap protection.

New Street Reservoir



Photo 17 - New Street Reservoir and left shoreline.



Photo 18 - New Street Reservoir and slopes.

APPENDIX C

SUMMARY OF ENGINEERING DATA

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

Name of Dam: New Street Reservoir Dam
Drainage Area: 13 acres
Elevation Top Normal Pool (Storage Capacity): 300 (240 AF)
Elevation Top Flood Control Pool (Storage Capacity): N.A.
Elevation Maximum Design Pool: 302.5
Elevation Top of Dam: 303

SPILLWAY CREST:

- a. Elevation: 300
- b. Type: Overflow
- c. Width: 30 inches
- d. Length: 8 feet
- e. Location Spillover: Right end of the dam
- f. Number and Type of Gates: None

OUTLET WORKS:

- a. Type: Two 42-inch diameter conduits (only one is operable)
- b. Location: Beneath the fifth arch from the right end of dam
- c. Entrance Inverts: N.A.
- d. Exit Inverts: N.A.
- e. Emergency Draindown Facilities: 20-inch diameter gate valve

HYDROMETEOROLOGICAL GAGES:

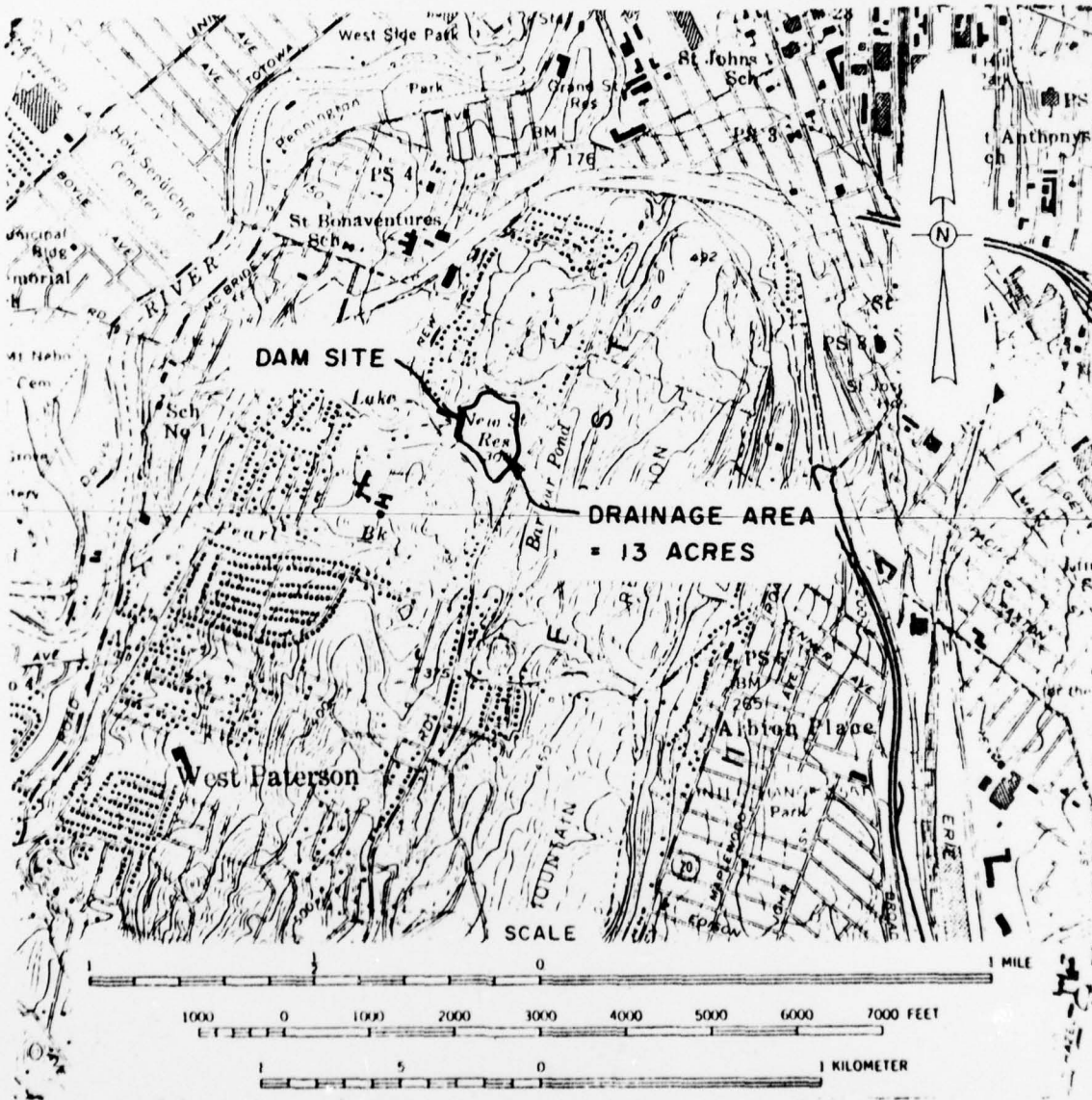
- a. Type: Staff gage
- b. Location: At the upstream slope of the reservoir
- c. Records: N.A.

MAXIMUM NON-DAMAGING DISCHARGE: 126 cfs

APPENDIX D

HYDROLOGIC COMPUTATIONS

PLATE I, APPENDIX D



NEW STREET RESERVOIR DAM DRAINAGE BASIN

ENGINEERING CONSULTANTS, INC.

NEW JERSEY (STATE) DAM SAFETY INSPECTION SHEET NO. 1 OF 2

NEW STREET RESERVOIR DAM

JOB NO. 1212-001

RESERVOIR AREA CAPACITY DATA

BY MAS DATE 8/14/78

NEW STREET RESERVOIR DAM

RESERVOIR AREA-CAPACITY

Normal Storage = 240 AF

Maximum Storage = 270 AF @ EL 302.5

Reservoir Surface Area = 11 Acres at
Elev 300.

Elev.	Reservoir Surface Area Acres	Reservoir Volume AF	Remarks
300	11	240	Normal Volume is assumed at Spillway Crest. The Spillway Crest is assumed to be at EL 300.
302.50	13	270	The area at maximum storage is obtained from known volume and elevation figures.
303	13+	276.5	

NEW STREET RESERVOIR DAM RESERVOIR CAPACITY CURVE

304

ELEVATION, FEET

302

300

240

250

260

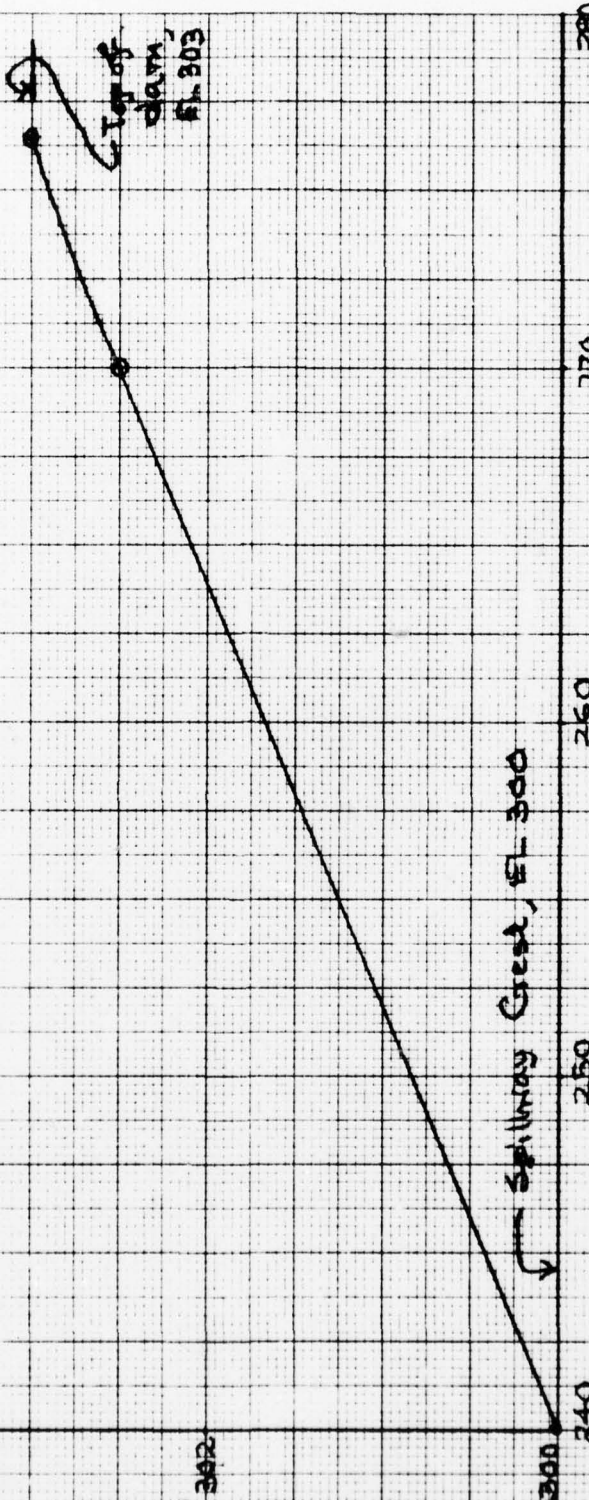
270

280

Spillway Crest, EL 300

RESERVOIR CAPACITY, ACRES-FOOT

Top of
dam,
EL 303



ECI-4

ENGINEERING CONSULTANTS, INC.

New Jersey Dam Safety Inspection

SHEET NO. 1 OF

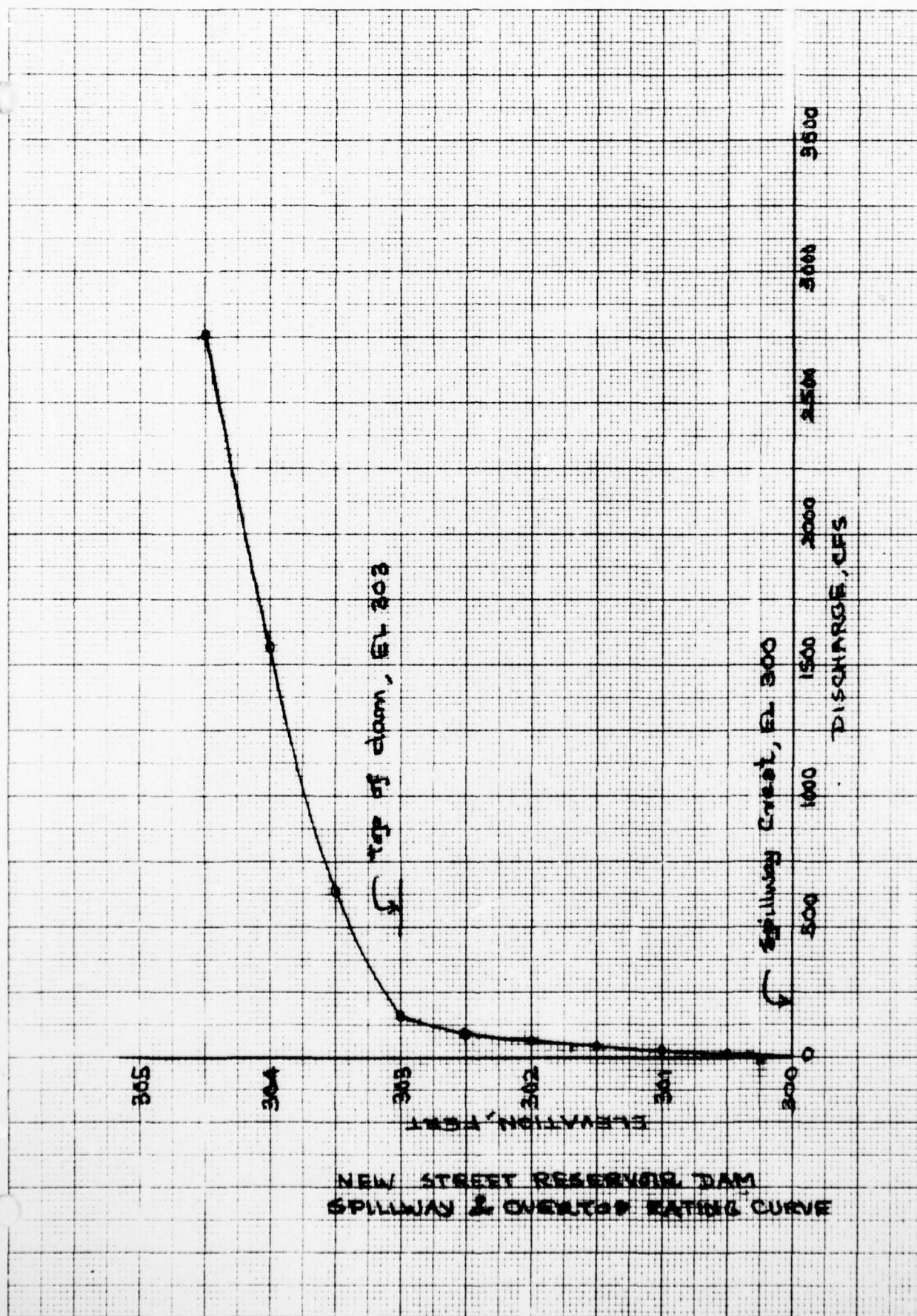
New St. Reservoir Dam

JOB NO. 1212

Spillway & Overtop Rating Curve

BY M.R.B. DATE 7-21-78

H = 0.5	Q = 3.03 (8) (0.5) ^{1.5} = 8.57
H = 1.0	Q = 3.03 (8) = 24.24
H = 1.5	Q = 24.24 (1.5) ^{1.5} = 44.53
H = 2.0	Q = " (2.0) ^{1.5} = 68.56
H = 2.5	Q = " (2.5) ^{1.5} = 95.82
H = 3.0	Q = " (3) ^{1.5} = 125.95
H = 3.5	Q = 24.24 (3.5) ^{1.5} + 3.03 (454.33) (0.5) ^{1.5} = 645.4 158.72
H = 4.0	Q = 24.24 (4.0) ^{1.5} + 3.03 (454.33) (1.0) ^{1.5} = 1570.5 193.92
H = 4.5	Q = 24.24 (4.5) ^{1.5} + 3.03 (454.33) (1.5) ^{1.5} = 2740.4 231.59



PMP DRAINAGE - NEW STREET DAM

Probable Maximum Precipitation

SHEET NO. _____ OF _____

JOB NO. 1212-001

BY JIN DATE July, 1978

PROBABLE MAXIMUM FLOOD CALCULATION (PMP)

DRAINAGE = .086 sq. mi. (.13 acres)
(Reservoir Surface Area)

From Hydrometeorological Report #33 "Seasonal Variation of the Probable Maximum Precipitation East of the 106th Meridian for Areas from 10 to 1,000 Square Miles and Duration of 6, 12, 24 and 48 Hours" 1966

For D.A. = 10 sq. mi.

6 hour rainfall duration

PMP = 25.0" for Zone "C" at this Basin.

Since D.A. < 10 sq. mi., No area reduction to be applied.

PMP Values for various rainfall duration

<u>Duration</u>	<u>PMP (inch)</u>
6 Hr.	1.00 = 25.0"
12 Hr.	1.09 = 27.25
24 Hr.	1.17 = 29.25
48 Hr.	1.26 = 31.50

PMP Values are reduced by 20% to account for misalignment of Basin and Storm Isohyets.

<u>Duration</u>	<u>PMP</u>
6 Hr.	20"
12 Hr.	21.8
24 Hr.	23.4
48 Hr.	25.2

Can of collection

NEW STREET RESERVOIR

SHEET NO. _____ OF _____

PMP FLOOD VOLUME

JOB NO. _____

48 HR PMP.

BY YIN DATE July 7848 HR. PMP FLOOD VOLUME

$$V_F = (25.2'' \times 43.2'') / 2 = \underline{27.3 \text{ AC-FT.}}$$

STORAGE VOLUME BETWEEN SPILLWAY CREST EL. 200.00

AND DAM CREST EL. 203.00

$$V_S = 276.5 \text{ AC-FT} - 240 \text{ AC-FT} = \underline{36.5 \text{ AC-FT.}}$$

SINCE $V_S > V_F$ OR $36.5 \text{ AC-FT} > 27.3 \text{ AC-FT.}$ NO RESERVOIR ROUTING IS REQUIRED.

APPENDIX E

STABILITY CALCULATIONS

New Jersey State Dam Inspection
New Street Reservoir

SHEET NO. 2 OF 3

JOB NO. _____

BY RBC DATE 8/11/81

Dead Load

Buttress $.150 (2.4 \times 2.0 \times 33) = 23.76^k$
 $.150 (2.4 \times 2.8 \times 33) = 33.26^k$
 $.150 (1.7 \times 36.12 \times 31) \frac{1}{2} = 143.08^k$

Shell Central \angle about 140°
 $\Delta O = 0.40$ perimeter.
 $.15 (1.0) (\pi \times 24 \times 0.4) (33) = 149.3^k$
349.4^k

Hydrostatic Loads

Vertical $\frac{1}{2} (.0624) (33)^2 (25) = 849.4^k$

Horizontal little

Uplift - None

ΣV loads $= 1198.8^k$

ΣH 849.4^k

Sliding Safety

Friction Factor

$\frac{849.4}{1198.8} = 0.71$ ←

The above does not include ice load or E.Q.

Because of the inclined upstream face and daily variation in reservoir level, it is not believed that large ice loads will develop.

Although the above friction factor is a bit higher than I would like, concrete-rock adhesion is ignored so that it doesn't worry me.

ENGINEERING CONSULTANTS, INC.

New Jersey State Dam Inspection
New Street Reservoir

SHEET NO. 3 OF 3

JOB NO.

BY RBC DATE 8/11/74

Overturning about heel of buttress

DL. \leftarrow

$$\begin{aligned} 23.74 & \times (1.0 + \frac{16.5}{2}) = 89.1 \text{ K}' \\ 33.26 & \times (5.5 + 1.0 + 16.5) = 764.98 \text{ K}' \\ 143.08 & \times (\frac{1}{3}(2.0 + 7.2 + 38.5)) = 6824.98 \text{ K}' \\ 149.3 & \times (2.0 + \frac{1}{2} \times 33) = 3807.2 \text{ K}' \\ & \text{(Approx)} \end{aligned}$$

Hydro

Vent. \leftarrow

$$849.4 \times (9.0 + \frac{2}{3} \times 33) = 26,331 \text{ K}'$$

(Approx)

$$\text{Horiz} \rightarrow 849.4 \times \frac{1}{3}(33) = 9,343 \text{ K}'$$

Σ RM \leftarrow

37817 K'

Σ OM \rightarrow

9343

$$\text{F.S.} = \frac{\text{RM}}{\text{OM}} = \frac{37817}{9343} = 4.05$$

Section is very safe against overturning.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		